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**U.S. Department of
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ABSTRACT CITATIONS

HS-016 125

TEXACO'S STRATIFIED CHARGE ENGINE-- MULTIFUEL, EFFICIENT, CLEAN, AND PRACTICAL

The continuing development of Texaco's stratified charge engine combustion concept, the Texaco Controlled-Combustion System (TCCS), is reported. TCCS conversions of the military L-141 engine have demonstrated inherently low exhaust emissions, multifuel capability, and improved fuel economy over the carburetted L-141 gasoline engine. Under contract to the U.S. Army Tank-Automotive Command, promulgated federal gaseous exhaust emissions standards were met in a naturally aspirated TCCS engine-powered M-151 vehicle equipped with EGR- and Texaco-developed exhaust catalysts. These low emissions were sustained for 50,000 miles (80,400 km) with moderate maintenance. The effects of different degrees of emission control and of multifuel operation on performance and fuel economy were characterized using a turbocharged L-141 TCCS engine-powered M-151 vehicle.

by M. Alperstein; G. H. Schafer; F. J. Villforth, 3rd.
Texaco Res. Center, Richmond, Va.
Rept. No. SAE-740563 ; 1974 ; 14p 9refs
Presented at the SAE Southern California Section meeting, 14 May 1974. Sponsored by the U. S. Army Tank-Automotive Command.
Availability: SAE

HS-016 126

AUTOMOTIVE EMISSIONS OF POLYNUCLEAR AROMATIC HYDROCARBONS

Automotive exhaust emissions of polynuclear aromatic (C-160) hydrocarbons (PNA) were reduced by 65-70% by current emissions control systems and by about 99% by two experimental advanced emission control systems. At a given level of emission control, PNA emission was primarily controlled by fuel PNA content through the transient storage of PNA in engine deposits and their later emission under more severe engine operating conditions. A relatively minor contribution to PNA emission was made by PNA synthesized from lower molecular weight fuel aromatics. Deposit-related PNA emissions were linearly correlated with the PNA content of the deposit formation fuel. In comparison with a fuel of field-average PNA content (0.5 ppm benzo(a)pyrene), a field-maximum fuel (3 ppm) contained four to seven times as much of three major PNA species and caused three to five times higher emissions of these species. PNA equivalent to 4-12% of the PNA present in consumed fuel accumulated in used engine oil, but the accumulation of PNA in engine oil did not cause a measurable increase in exhaust PNA emissions under normal oil consumption conditions. Large increases in PNA emission occurred when oil consumption was artificially increased to very high levels. Partial loss of some PNA species occurred by chemical reactions in the collection system. From 52% to 58% of the emitted benzo(a)pyrene and benz(a)anthracene and their alkyl derivatives were lost, but other, less reactive PNA species

were not lost. Conclusions as to relative effects of variables on PNA emission are not affected.

by G. P. Gross
Esso Res. and Engineering Co., Linden, N. J.
Contract CPA-22-69-56; CPA-70-104; EPA-68-04-0025
Rept. No. SAE-740564; CRC-APRAC-Proj-CAPE-6-68 ; 1973 ; 23p 22refs
Presented at the National Combined Farm, Construction and Industrial Machinery and Fuels and Lubricants Meetings, Milwaukee, Wis., 10-13 Sep 1974. Sponsored by the American Petroleum Inst. and the Motor Vehicle Mfrs. Association through the Coordinating Res. Council, Inc., and by the Environmental Protection Agency.
Availability: SAE

HS-016 127

PASSENGER CAR FUEL ECONOMY DURING NON-URBAN DRIVING

A new Environmental Protection Agency highway driving cycle for determining fuel economy was constructed from actual speed-versus-time traces generated by an instrumented test car driven over a variety of nonurban roads and highways. This cycle reflects the correct proportion of operation on each of the four major types of nonurban roads and preserves the non-steady-state characteristics of real-world driving. The average speed of the cycle is 48.2 mph and the cycle length is 10.2 miles, close the average nonurban trip length. Preliminary vehicle tests show that rotary and conventional engine-powered vehicles achieve approximately the same ratio of highway fuel economy to urban (Federal Test Procedure, FTP) fuel economy. Various unconventional engine-powered vehicles show different values for the ratio of highway to urban fuel economy. The continued use of the highway cycle will establish a data base which, when used in conjunction with FTP data, will allow better estimates of both fuel economy and exhaust emission trends.

by T. C. Austin; K. H. Hellman; C. D. Paulsell
Environmental Protection Agency, Washington, D. C.
Rept. No. SAE-740592 ; 1974 ; 6p 2refs
Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.
Availability: SAE

HS-016 128

THE 1974 AMC COLLEGIATE FUEL ECONOMY RUNS

Three collegiate automobile runs are described which were sponsored by American Motors Corp. to demonstrate that savings in fuel are possible when good driving practices are observed. Driving 1974 Gremlins, the young winners proved that typical drivers can in fact achieve economies in fuel of the kind that are being sought nationally. Reduction of speed proved to be a major contributing factor.

by A. C. Haman
University of Detroit, Mechanical Engineering Dept.
Rept. No. SAE-740593 ; 1974 ; 9p 2refs
Presented at the SAE West Coast Meeting, Anaheim, Clif., 12-16 Aug 1974.
Availability: SAE

HS-016 129

FUEL ECONOMY TRENDS AND CATALYTIC DEVICES

The catalytic converter systems included on all 1975 model automobiles are discussed as a major departure in control of automotive exhaust, providing excellent control of emissions, good fuel economy, and improved overall value to the customer. Passenger car fuel economy trends are reviewed, fuel economy definition examined, and measurements and testing reported. The effects of stops per mile versus average speed, tire construction, and aerodynamic change on fuel economy are shown. Details are also given on exhaust emission standards from 1960 to 1978, engine factors, unleaded gasoline, and justifications for the catalytic converter.

by R. C. Stempel; S. W. Martens
General Motors Corp., Detroit, Mich.

Rept. No. SAE-740594 ; 1974 ; 18p 24refs
Presented at the SAE West Coast Meeting, Anaheim, Calif.,
12-16 Aug 1974.
Availability: SAE

HS-016 130

DIESEL FAN DRIVES, DO THEY SAVE FUEL?

A method for measuring diesel fuel consumption accurately over distances of five miles or less was developed so that many fan-on, fan-off data sets could be gathered in a short time for statistical evaluation and analysis. A second test sequence involved fan-on, fan-off fuel economy tests over a highway route for comparison against the Cummins Vehicle Mission Simulation Computer Program. The predicted results from this program agreed substantially with the actual highway economy test data obtained. More than four million charted miles of roads throughout the world are available through this program for predicting fan-off fuel savings. Results of several typical routes are given.

by K. A. Boyd; J. Easterly
Eaton Corp.
Rept. No. SAE-740595 ; 1974 ; 9p 5refs
Presented at the SAE West Coast Meeting, Anaheim, Calif.,
12-16 Aug 1974.
Availability: SAE

HS-016 131

COMPARISON OF MODULATED (VISCOUS) VERSUS ON-OFF FAN CLUTCHES

The desirability of fan drives for heavy truck applications is discussed and related to the energy crisis and the regulation of noise levels. The reduction of power drain and fan noise is evaluated for two types of fan drives generally available: the on-off air-actuated clutch and the modulated viscous drive. The principles of operation, life, and application considerations are also discussed. The on-off clutch offers the maximum in power gain while eliminating fan noise for the majority of the time. The viscous drive also reduces power drain to fan while reducing fan noise. In general, application of the on-off clutch is easier since cooling requirements are not altered by a new fan. In all cases when shutters are used, caution

must be exercised to assure proper sequencing with fan engagement.

by E. G. Blair
Wallace Murray Corp.
Rept. No. SAE-740596 ; 1974 ; 5p
Presented at the West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.
Availability: SAE

HS-016 132

A MODULATED CLUTCH FOR VEHICLE COOLING SYSTEM FANS--WHY AND HOW

The modulating fan clutch which was chosen as a fan speed regulating device to improve the overall efficiency of the internal combustion engine is discussed. Generally the engine cooling system is oversized for normal operating conditions. With a fan speed regulating device providing the exact amount of airflow to maintain proper engine cooling temperature, the horsepower not required to turn the fan can be utilized for increased speed or fuel economy. This device also serves to reduce noise as the fan is one of the major contributors to this problem. Design goals and types of mechanisms considered are presented, along with results of component and system testing of the modulating fan clutch.

by R. B. Spokas
Borg-Warner Corp.
Rept. No. SAE-740597 ; 1974 ; 10p
Presented at the SAE West Coast Meeting, Anaheim, Calif.,
12-16 Aug 1974.
Availability: SAE

HS-016 134

RESULTS OF A LEGAL IMPACT STUDY: THE LOWER LEGAL DRINKING AGE AND YOUTH CRASH INVOLVEMENT

Several states lowered the legal drinking age to 18 between 1971 and 1973. The objectives of this research were to determine if alcohol-related highway crashes increased among legally-affected populations of drivers in three study states, and to determine, if changes were found in the frequencies of alcohol-related crashes, whether a causal relationship exists between the crash experience increases and the legal changes. Seven states were studied in a multiple time-series quasi-experimental design. A surrogate measure dependent variable was developed consisting of late night, single-vehicle crash involvements with male drivers. A surrogate was determined to be necessary in that officially reported alcohol involvement statistics were found to be inconsistently measured over time and incomparable between states. The developed three-factor surrogate was found to be consistently 53-66% alcohol-related. Through controlled time-series analyses including the utilization of the Box-Tiao (1965) auto-regressive time-series "t" statistic, it was found that statistically and socially significant increases in alcohol-related crashes resulted in Michigan and Maine following the drinking age change. No concomitant changes were found in Vermont, or in any of the four control states. Analyses of age-specific alcohol-related crash frequency distributions provided support and explanation for the results of the time-series analyses, and provided a basis for prediction regarding the expected effect of the lower legal drinking age on youth crash involvement. Full data sets are in-

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cluded in tabular form in appendices. Recommendations for social action in response to national directions toward the lower legal drinking age, and for additional research are offered.

by R. L. Douglass
Publ: HIT LAB REPORTS v5 n4 p1-15 (Oct 1974)
1974 ; 16refs

Excerpted from the complete study entitled "The Effect of Lower Legal Drinking Ages on Youth Crash Involvement" by Douglass, L. D. Filkins, and F. A. Clark, Jun 1974, 211 p, HS-801 213.

Availability: See publication

HS-016 135

CITY CARS--ARE THEY WORTH IT?

A sketchbook for the design of ultra-small economy cars is presented. The various problems and alternative solutions open to designers are described, and the discussion is a technical one which does not take economic factors into account. A successful urban vehicle will be a small one, easy to drive, easy to enter and leave, easy to stow shopping bundles in, tough, with a minimum service requirements. It should retain a sufficient air of familiarity not to discourage purchasers. Although the vehicle would be primarily used for city driving, it should also be reasonably quick, stable, and quiet on the open road not have a limited range. Drawings and photographs are included to illustrate number of wheels, power units, suspension and steering, and equipment.

by J. R. Daniels
Publ: AUTOCAR v141 n4075 p20-3 (30 Nov 1974)
1974

Availability: See publication

HS-016 136

THE ECONOMICS OF HIGHWAY SAFETY

An economic analysis of the provision of highway safety is presented, with the exclusion of any explicit treatment of the causes of traffic accidents or of psychological or cultural attitudes toward accidents and accident prevention. An examination of the term increased safety is presented along with the so-called production and consumption of safety. The development of a mathematical model is detailed. It is shown that economic analysis can provide a useful tool for the determination of appropriate levels of safety in the transportation system. It is concluded that there are definite limits on the level of safety that is desirable; that level is dependent on the costs of maintaining it and the benefits derived from it.

by R. C. Anderson
Publ: TRAFFIC QUARTERLY v29 n1 p99-111 (Jan 1975)
1975 ; 11refs
Availability: See publication

HS-016 137

DIESEL TRUCK FAN CLUTCHES TO MEET THE ENERGY AND ENVIRONMENTAL CHALLENGES

Bearing arrangements designed to maximize stability and load capacity within available envelope dimensions are discussed. A means is also presented of negating the detrimental effects of

cylinder reactions in a pneumatic clutch, while at the same time increasing the torque-to-space ratio. These concepts were realized during a study expressly intended to view the various design elements with the requirements of a diesel truck fan clutch in mind. The study resulted in the development of a non-modulating, direct acting thermal control valve, specifically engineered to complement the action of a pneumatic fan clutch as part of an overall temperature controlling system.

by J. Hanks; C. Selby; P. Loken
Horton Mfg. Co., Inc.; Horton Industries, Inc.
Rept. No. SAE-740598 ; 1974 ; 12p 12refs
Presented at the SAE West Coast Meeting, Anaheim, Calif.,
12-16 Aug 1974.
Availability: SAE

HS-016 138

CONFIGURATION, DESIGN, AND ANALYSIS OF WEAVING SECTIONS

The effect that lane configuration can have on weaving section operations is discussed and illustrated, with emphasis on how lane utilization may be substantially controlled by configuration. Data from the 1963 urban weaving area capacity study are used to quantify these effects. Further illustration is given through the use of lane transition matrices to model gross weaving movements under various configurations. It is concluded that the weaving procedure in the Highway Capacity Manual leads to inadequate results because of the failure to differentiate between weaving and nonweaving lane requirements. That procedure is modified to take this into account and to avoid the design of sections with a proper total number of lanes. The modified procedure yields a configuration that prohibits proportional use of those lanes by weaving and non-weaving traffic.

by R. P. Roess; W. R. McShane; L. J. Pignataro
Publ: TRANSPORTATION RESEARCH RECORD n489 p1-12 (1974)
1974 ; 10refs
Doctoral dissertation, Polytechnic Inst. of Brooklyn, R. P. Roess. Sponsored by the National Cooperative Hwy. Res. Program and the TRB Com. on Hwy. Capacity and Quality of Service.
Availability: See publication

HS-016 139

EFFECTS OF OPPOSING FLOW ON LEFT-TURN REDUCTION FACTORS AT TWO-PHASE SIGNALIZED INTERSECTIONS

The effects of opposing flow on left turn reduction factors in computing the capacity of two lane approaches to two phase signalized intersections with no separate left turn lanes were examined in a field study. Time lapse photography was used to gather data on the approaching and opposing volumes and the delaying effects of left turners. Reduction factors were computed for different numbers of left turns per cycle by using regression analysis. The two variables that explained most of the variance were the ratio of the opposing flow in the curb lane to its capacity and the ratio of the arrival time of the first left-turning car to the green-plus-yellow time. Results indicate that, when the opposing curb lane is loaded, left turns have a much greater reducing effect than that given in the Highway Capacity Manual. The capacity reducing effect of a single left-

turning vehicle is greater than the incremental reduction effect of the second, third, and fourth left turners in a signal phase.

by E. Fellinghauer; D. S. Berry
 Publ: TRANSPORTATION RESEARCH RECORD n489 p13-8 (1974)
 1974 ; 9refs
 Sponsored by the TRB Com. on Hwy. Capacity and Quality of Service.
 Availability: See publication

HS-016 140

ANALYSIS OF URBAN AREA AUTOMOBILE EMISSIONS ACCORDING TO TRIP TYPE

Travel data from the Pittsburgh transportation survey and emissions data developed by the EPA were used to estimate Allegheny County (Pittsburgh), Pennsylvania, automobile emissions according to trip purpose, length, origin, and destination. The results include estimates of diurnal evaporative emissions, cold-start and hot-soak emissions, and actual running emissions. Home-based work trips and trips to and from the central area of the county each produce one-third to one-half of Allegheny County automobile emissions and are the dominant causes of automobile emissions in the county. Cold starts and evaporation produce approximately 50% of the hydrocarbons and 25% of the carbon monoxide. Trips shorter than five miles and trips longer than five miles produce roughly equal quantities of carbon monoxide and hydrocarbons. Long trips produce greater quantities of nitrogen oxides. These findings suggest that improved peak period and radial transit may be effective in improving air quality through reducing automobile travel if such transit reaches peripheral areas of the county. However, cold-start and evaporative emissions may significantly impair the effectiveness of transit approaches that rely on the automobile for residential collection and distribution.

by J. L. Horowitz; L. M. Pernela
 Publ: TRANSPORTATION RESEARCH RECORD n492 p1-8 (1974)
 1974 ; 8refs
 Sponsored by the Com. on Passenger and Freight Transp. Characteristics.
 Availability: See publication

HS-016 141

CAN VEHICLE TRAVEL BE REDUCED 20 PERCENT IN THE SOUTH COAST AIR BASIN?

The possibility of reducing vehicle travel in California's South Coast Air Basin is evaluated. Air pollution programs, analysis of travel, travel constraints, and reduction strategies are reviewed. It is concluded that a 20% reduction in vehicle-miles of travel for the basin cannot be achieved in the short run because the automobile is more of a necessity here than in many other urban areas. This stems from the general form of the basin and its low population density. However, a 20% reduction is possible in the long run if area growth is controlled and land use is restricted.

by R. O. Watkins; J. B. Borden; F. F. Kirchner
 Publ: TRANSPORTATION RESEARCH RECORD n492 p9-16 (1974)
 1974 ; 10refs
 Sponsored by the TRB Com. on Passenger and Freight Transportation Characteristics
 Availability: See publication

HS-016 142

ENVIRONMENTAL IMPLICATIONS OF AUTOMOBILE-FREE ZONES

Some of the environmental issues associated with automobile-free zones are clarified and a determination is made whether automobile-free zones can reduce environmental problems. The paper gives planners an overview of the subject and suggests some procedures for future studies. Past experience with such zones has indicated that noise and air pollution are significantly reduced on streets where automobiles are banned. As to the wider, external effect of automobile-free zones, few or no data exist, but an analytical procedure is suggested to assess this effect: compare trips to a target area, with and without the zone, and convert this trip information into pollution-emission data. Although the relationship between automobile-free zones and nonautomobile modes is not certain, it appears that these modes conserve more energy than do automobiles and that they emit lower levels of certain pollutants. To reduce area-wide environmental problems, it is suggested that automobile-free zones be centrally located in relation to market areas and transit systems, that provisions be made to handle rerouted traffic, and that use of nonautomobile modes to automobile-free zones be encouraged.

by W. Lieberman
 Publ: TRANSPORTATION RESEARCH RECORD n492 p17-26 (1974)
 1974 ; 14refs
 Sponsored by the TRB Com. on Passenger and Freight Transportation Characteristics.
 Availability: See publication

HS-016 143

A SIMPLE MODEL FOR ESTIMATING REGIONAL AUTOMOTIVE EMISSIONS

A simple model for estimating regional automotive emissions of carbon monoxide, hydrocarbons, and nitrogen oxides is developed. The model is designed for use when rough, low-cost pollution estimates are desired. Traffic volumes are assumed to be available. Given the characteristics of the regional highway network, the model calculates the vehicle miles of travel over different road types in each specified subarea of the region and the vehicle speed at which travel takes place. Then by use of emission functions that relate the output of pollutants to vehicle speeds, emission estimates are calculated for the given travel pattern. An application to the Watertown, New York, region is discussed.

by F. J. Cesario
 Publ: TRANSPORTATION RESEARCH RECORD n492 p27-35 (1974)
 1974 ; 11refs
 Sponsored by the Environmental Protection Agency and the TRB Com. on Vehicle Inspection and Regulation.
 Availability: See publication

HS-016 144

THE ROLE OF PERIODIC MOTOR VEHICLE INSPECTION IN AIR POLLUTION ABATEMENT

In many areas of the United States, exhaust emissions from motor vehicles are a major contributor to air pollution, causing governments at all levels to adopt measures designed to reduce

emissions from both existing and new vehicles. Most of these measures attempt to reduce emissions per mile rather than the number of vehicles or the number of miles of operation. For these measures to be effective, the vehicles must meet appropriate emission standards through their useful life, which requires an effective program of continuing maintenance for each vehicle. This can be ensured by a system of periodic motor vehicle emission inspection. This paper develops the characteristics of such a system and the type of inspection process required. The relationship of inspection to maintenance is described. Issues raised by the prospect of mandatory inspection and maintenance are discussed and resolutions suggested.

by M. Easterling
 Publ: TRANSPORTATION RESEARCH RECORD n492 p36-40 (1974)
 1974 ; 4refs
 Sponsored by the TRB Com. on Vehicle Inspection and Regulation.
 Availability: See publication

HS-016 145

WARRANTING FIXED ROADWAY LIGHTING FROM A CONSIDERATION OF DRIVER WORK LOAD

Whether efficient and effective vehicle control is probable within a given night driving environment is evaluated. A warranting scheme for roadway lighting is developed based on whether efficient and effective vehicle control can be achieved. Driver visual work load is used as the measure of effectiveness for vehicle control. Driver task levels are defined for the computation of work load or information demand. The task levels are positional, primarily routine speed and lane position control; situational, changes in speed, direction of travel, or position as a result of changes in situations; and navigational, selecting and following a route. Information demand is defined to be the time, in seconds, required to fulfill a sequence of positional, situational, navigational, and redundant positional information searches. Information supply is defined to be the time, in seconds, representing the visibility distance ahead for a given operating speed. When information demand exceeds information supply without roadway lighting, then roadway lighting is assumed to be warranted. Formulas for the computation of information demand, information supply, warranting conditions, and otherities are included.

by N. E. Walton J. Messer
 Publ: TRANSPOR TATION RESEARCH RECORD n502 p9-21 (1974)
 1974 ; 9refs
 Sponsored by the TRB Com. on Visibility.
 Availability: See publication

HS-016 146

EVALUATION OF A THREE-BEAM VEHICLE LIGHTING SYSTEM

One near-term improvement for vehicle forward lighting, a three-beam, four headlamp system which includes a high and low beam with increased intensities and a moderately high-intensity midbeam, is examined. The results of a three-phase evaluation of various combinations of beam usages to achieve the three modes is described. A computer program calculated the glare in the rearview mirror as a following vehicle with different headlighting systems approached from the rear. The

results show very minor differences in glare among any of the beam configurations on the same mode. Vehicles equipped with the three-beam systems were driven by a sample of drivers under a representative sample of road and traffic conditions. An evaluation of the subjective responses of the drivers to the system was made, and objective measures of the traffic stream's responses (through dimming requests) were recorded. There were slight differences in the number of dimming requests among the various configurations, and the drivers subjectively favored the use of a mid-beam mode but were unable to select one high-beam system as superior. The last phase of the program was an empirical determination of seeing distances, which showed that a beam configuration using all four headlamps in the high-beam mode yielded better seeing distances than others. The high-beam mode using all four headlamps appears to be the best configuration of those tested because it does not represent excessive glare and does not yield greater dimming requests, but does yield greater seeing distances.

by B. Adler; H. Lunenfeld
 Publ: TRANSPORTATION RESEARCH RECORD n502 p22-33 (1974)
 1974 ; 10refs
 Sponsored by the TRB Com. on Visibility. Based on a study performed at the Airborne Instruments Lab. for the National Hwy. Traffic Safety Administration.
 Availability: See publication

HS-016 147

SOME OPERATIONAL CONSIDERATIONS AFFECTING THE PERFORMANCE OF CURRENT AND PROPOSED HEAD-LAMP BEAMS

A digital computer simulation was used to evaluate some factors that determine the overall effectiveness of current and proposed beams. Specifically, simulation was used to derive predicted visibility distances for a typical U.S. low beam and a proposed midbeam, with correct aim and with a 1-deg (0.017-rad) upward or downward misaim. This demonstrated that aiming errors of this amount significantly affect a driver's visibility and the glare intensities to which opposing drivers are exposed. The midbeam offered a 20% increase in visibility of a target located at the right edge of the lane on a two-lane road compared to the present low beam when the beams were correctly aligned. Because the midbeam provides greater visibility than the low beam, it was shown that it is appropriate to dim earlier from high beam to midbeam than to low beam, thereby obtaining better visibility and earlier reduction of high-beam glare. Use of the midbeam as the major meeting beam would make it more feasible to increase the intensity of the high beam. An examination of glare intensities from the beams in rearview mirrors showed the importance of lamp aim and mirror reflectivity to glare discomfort. For the conditions studied, it was concluded that the midbeam offers a satisfactory increase in visibility compared to the low beam and does not significantly increase glare if lamp aim is adequately controlled.

by R. G. Mortimer; J. M. Becker
 Publ: TRANSPORTATION RESEARCH RECORD n502 p34-40 (1974)
 1974 ; 9refs
 Sponsored by the TRB Com. on Visibility.
 Availability: See publication

HS-016 148

REFLECTORIZED LICENSE PLATES: DO THEY REDUCE NIGHT REAR-END COLLISIONS?

In Virginia 100,000 sets of experimental reflectorized and 100,000 sets of control nonreflective 1971 license plates were randomly distributed. Each distribution point in the state received and sold a pro rata number of each type. Plates were distributed evenly throughout each day of the distribution period. Accident data for the vehicles using experimental and control plates were collected for a 12-month period. These data were specifically coded and stored for retrieval by the state police. The reporting format distinguished between the striking vehicle and the vehicle struck. Reflectorized and control comparisons involved statewide data concerning night and daytime accidents. The age of the driver, his or her driving experience, the age of the vehicle, and the weather conditions at the time of the crash were analyzed; accident data were also analyzed. There was no statistically significant difference between the number of night rear-end collisions and crashes of vehicles equipped with reflectorized license plates and those with control nonreflective license plates.

by C. B. Stoke

Publ: TRANSPORTATION RESEARCH RECORD n502 p41-57 (1974)

1974 ; 11refs

Sponsored by TRB Group 3--Operation and Maintenance of Transportation Facilities. Includes discussion by W. L. Sacks and R. C. Vanstrum (3M Co.), and author's closure.

Availability: See publication

HS-016 149

OBSTACLE VISIBILITY IN RURAL NIGHT DRIVING AS RELATED TO ROAD SURFACE REFLECTIVE QUALITIES

Night driving visibility distances were measured in a series of experiments in which road surface was the main independent variable. Two rough and two smooth road surfaces with large variations in their retroreflective qualities were used. Reflective qualities were further varied by measuring visibility distances on both dry and wet road surfaces. The size of the obstacles was 0.4 by 0.4 m. The luminance factor was varied between 2% and 26%. Visibility distances were obtained in the following full-scale simulated driving situations: low beams without opposing light; low beams opposing low beams; and high beams without opposing light. Safe visibility distances were normally obtained in high-beam situations. Low beams opposing low beams constituted the main safety problem. It is suggested that a low degree of specular reflection (low glare) from the road surface is more important than high retroreflection (high brightness).

by G. Helmers; K. Rumar

Publ: TRANSPORTATION RESEARCH RECORD n502 p58-69 (1974)

1974 ; 18refs

Sponsored by the TRB Com. on Visibility.

Availability: See publication

HS-016 150

A REAL-TIME FRONTRAGE ROAD PROGRESSION ANALYSIS AND CONTROL STRATEGY

Urban freeway congestion problems due to normal peak-hour demands exceeding capacity and to freeway incidents are examined. It is proposed that, at least during these conditions, the adjacent frontage roads should be operated as major arterials to provide additional freeway capacity. A real-time traffic-responsive frontage road progression analysis and control strategy that could be used in operating the frontage roads as a major traffic-carrying facility is presented. Previous computer control applications and future implementation of the strategy are discussed. The frontage roads are analyzed for progression as if the continuous, one-way frontage roads and diamond interchanges were combined to form a major two-way signalized arterial. To maximize frontage road progression, each interchange is assumed to operate on either a three-phase or a four-phase signal sequence. The progression optimization algorithm selects the phase sequence yielding the maximum progression. The traffic-responsive strategy using the three- and four-phase signal sequences is also described.

by C. J. Messer; R. H. Whitson; J. D. Carvell, Jr.

Publ: TRANSPORTATION RESEARCH RECORD n503 p1-12 (1974)

1974 ; 7refs

Prepared for the Federal Hwy. Administration by the Texas Transportation Inst. in cooperation with the Texas Hwy. Dept. and the city of Dallas. Sponsored by the TRB Com. on Traffic Control Devices. Includes discussion by J. M. McDermott (Illinois Dept. of Transportation) and authors' closure.

Availability: See publication

HS-016 151

SOME TRAFFIC SIGNALIZATION DESIGN GUIDES

Guides for use in the design of traffic signal installations that require multiphase signalization are presented. The procedures permit the signal designer to consider all phasing patterns and to select the optimal pattern. Design tables are presented for use at moderately important intersections. Knowing the critical lane volume for each movement through the intersection permits the designer to select from the tables the required g/c ratio for each phasing pattern. The pattern that requires the smallest g/c ratio is the optimal pattern. For more critical intersections, a more sophisticated design guide is given. It is a computer program that calculates the required g/c ratio for each signalization pattern. It also computes the vehicular delay that would be obtained under different equipment systems (single-dial pretimed, three-dial pretimed, and several types of traffic-actuated). It then provides a cost-effectiveness comparison of the alternative equipment configurations. Examples of the use of the tables and the computer program are included.

by K. G. Courage; J. A. Wattsworth; G. C. Price

Publ: TRANSPORTATION RESEARCH RECORD n503 p13-24 (1974)

1974 ; 1ref

Sponsored by the TRB Com. on Traf. Control Devices.

Availability: See publication

August 29, 1975

HS-016 155

HS-016 152

URBAN GUIDANCE: PERCEIVED NEEDS AND PROBLEMS [HIGHWAY INFORMATION SYSTEM]

A comprehensive questionnaire dealing with all aspects of urban guidance was prepared, field-tested, and distributed nationwide, and 727 usable returns were received. Portions of the questionnaire dealing with trip plan preparation and trip plan execution were analyzed, with analyses made separately in terms of "stranger" and "local stranger" trips. Although there was a significant difference in the proportion of each class of respondent insofar as the preparation of a written trip plan is concerned, differences in the relative importance of perceived information needs and problems were less than expected. Almost 50% of all respondents reported feeling lost at some stage of their most recent trip. Of these, about half were actually lost. Rank ordering of problem types showed that most of those ranking high dealt with difficulties in arterial navigation. Maps were found to be the most important element used in trip plan preparation; map availability and map usability were correspondingly found to rank very high as problem types for stranger trips. Route numbers and street names and numbers were found to rank first or second among needed information types for all classes of respondents.

by G. F. King; H. Lunenfeld
Publ: TRANSPORTATION RESEARCH RECORD n503 p25-37 (1974)
1974 ; 13refs

Sponsored by the American Assoc. of State Hwy. and Transportation Officials in cooperation with the Federal Hwy. Administration, and by the TRB Com. on Motorist Information Systems.

Availability: See publication

latory signs. Performance on individual sign messages was highly correlated across the different measures.

by R. E. Dewar; J. G. Ells
Publ: TRANSPORTATION RESEARCH RECORD n503 p38-47 (1974)
1974 ; 4refs
Sponsored by the Canadian Ministry of Transport and the TRB Com. on Motorist Information Systems.
Availability: See publication

HS-016 154

ECONOMIC EVALUATION OF MOBILE AND MODULAR HOUSING SHIPMENTS BY HIGHWAY. VOL. 2, APPENDICES. FINAL REPORT

Appendices are presented to a study on the data needed to reach rational decisions regarding state regulations so that wide-load movements can be made as safely as possible, without undue economic burdens to the purchaser of mobile homes, to the states, or to other users of the highways. Appendices consist of: an annotated bibliography; state listings of applicable regulations and attendant costs as of 1 July 1973; regulation variations between states and attendant costs as of 1 July 1943; traffic data collection and reduction; formulation of costs to other traffic; instructions to interviewer; motorist opinion and attitude data and analyses; and selected comments from motorists.

by W. D. Glauz; B. M. Hutchinson; D. R. Kobett
Midwest Research Inst., Kansas City, Mo.
Contract DOT-FH-11-7989

Rept. No. MRI-3744-E-Vol-2; FHWA-RD-74-64 ; 1974 ; 182p
Rept. for 15 Feb-15 Oct 1973. Vol. 1 is HS-016 155.
Availability: NTIS

HS-016 153

COMPARISON OF THREE METHODS FOR EVALUATING TRAFFIC SIGNS

Three experiments were conducted to compare three methods of evaluating traffic sign perception. In the first, subjects were required to classify signs according to type and to identify the meaning of the signs while driving toward them under normal highway traffic conditions at 30 mph (48 kph) and 50 mph (81 kph). The distances at which subjects were able to classify and identify each sign were measured. Two classes of signs, regulatory and warning, were used, and half of each class had symbolic messages while the other half had verbal messages. The second experiment was a partial replication of the first, with certain modifications. The signs were one-third normal size and the subject drove the vehicle at 17 mph (27 kph). The third experiment was a laboratory study in which verbal reaction time required to classify and identify slides of traffic signs was measured. Signs used in the first two experiments were used. The results indicated that the three measures of performance were closely related. Signs were classified at a greater distance than they were identified. Performance was better on symbolic than on verbal signs (except for the reaction time measure), and it was better on warning than on regulatory

HS-016 155

ECONOMIC EVALUATION OF MOBILE AND MODULAR HOUSING SHIPMENTS BY HIGHWAY. VOL. 1, RESEARCH REPORT. FINAL REPORT

Data were studied which are needed for decision making regarding state regulations so that wide-load movements can be made as safely as possible, without undue economic burdens to the purchasers of mobile homes, to the states, or to other users of the highways. The project included extensive photographic and visual observations of vehicular traffic in the vicinity of 12- and 14-ft wide mobile and modular homes in 20 states, with about 12,000 miles being logged on 63 trips. Nearly 3000 motorists were stopped on the highways of six states and interviewed. These interview and associated mail-back questionnaires were analyzed to determine public opinions concerning many vehicles including mobile homes. Extensive costs and operational data were obtained from carriers of wide loads, and cost and regulation information were gathered from officials of most states. Several subjects were addressed, including: the need for permits; the advisability of multiple-trip permits; permit costs and reciprocity; the advisability of divisible loads; the use of divided vs two-lane roads; reasonable speeds for wide loads; rear lighting needs; the advisability of escort vehicles; differences between 12- and 14-wides; differences between mobiles and modulars; specific

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safety hazards noted; and regulatory questions such as signing and flagging.

by W. D. Glauz; B. M. Hutchinson; D. R. Kobett
Midwest Res. Inst., 425 Volker Blvd., Kansas City, Mo. 64110
Contract DOT-FH-11-7989
Rept. No. MRI-3744-EVol-1; FHWA-RD-74-63 ; 1974 ; 238p
21refs
Rept. for 15 Feb-15 Oct 1973. Vol. 2 is HS-016 154.
Availability: NTIS

HS-016 156

ENERGY STATISTICS. A SUPPLEMENT TO THE SUMMARY OF NATIONAL TRANSPORTATION STATISTICS. FINAL REPORT

This annual report is a compendium of selected time-series data describing the transportation, production, processing, and consumption of energy, based on statistics compiled by the Department of the Interior, the Interstate Commerce Commission, and the American Petroleum Institute. The report is divided into three main sections: energy transport, containing such items as the revenues and expenses of oil pipeline companies, number and capacities of U.S. tank ships, and the total crude oil transported in the U.S. by method of transportation; reserves, production, and refining, revealing the growth over time of the U.S. oil and natural gas reserves, refinery capacity, and yields; and energy consumption, displaying trends in the demand for fuel and power. Throughout this part, the transportation sector is emphasized. Included are the gasoline and oil costs of automobiles of different sizes, the consumption of petroleum by type of product, the electrical energy consumed by the local transit industry, and other important statistics describing the supply and demand for energy.

by W. F. Gay
Department of Transportation, Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-OST-74-12 ; 1974 ; 155p 26refs
Rept. for 1961-1973.
Availability: GPO

HS-016 157

DESIGNING SMALL CARS TO MEET REGULATIONS

The weight of emissions, damageability, safety, and noise regulations which fall heavily on the small car is examined with regard to the obligations put on the designer of the cars. It is noted that all the regulations could threaten the viability of the small car. A design exercise is presented which takes an unregulated small car through conversion to U.S. standards and appraises the engineering consequences. It is shown that the costs associated with meeting federal automotive regulations are significant, paid by the consumer as initial cost, added operating expense, and added inconvenience. The negative effects of added weight on the small car are noted. It is concluded that the net benefit from automotive regulations should be reexamined in the light of their impact on the small

HSL 75-8

car segment of the car market, a segment which is becoming increasingly important in view of energy conservation needs.

by C. Marks; R. G. Fischer; E. E. Stewart
Publ: AUTOMOTIVE ENGINEERING v82 n10 p33-7 (Oct 1974)
1974
Based on "Impact of Safety, Energy and Emission Requirements on Vehicle Design," by C. Marks, R. G. Fischer, and E. E. Stewart, HS-015 357.
Availability: See publication

HS-016 158

SYNTHETIC FUELS: WHERE WE STAND TODAY

Promising synthetic fuels are evaluated, with consideration given to how they perform, their advantages and disadvantages. It is suggested that an idealized vehicle fuel should have: high volumetric energy density; high mass energy density; high stability at normal atmospheric conditions; easy transfer characteristics from large stationary storage facilities to on-board vehicle storage; long storage life; relative inert and nontoxic properties in handling and use; and minimal pollution or health hazards from exhaust. Tabular comparisons of properties, description, and characteristics are made for the synthetic fuels hydrogen liquid, methane liquid, propane liquid, isoctane, benzene, methanol, ethanol, ammonia, metallic hydride, and projected batteries. Various application potentials of synthetic fuels are described, including aviation and space, road-type vehicles, agricultural and construction vehicles, recreational vehicles, and small powerplants.

Publ: AUTOMOTIVE ENGINEERING v82 n10 p38-43 (Oct 1974)
1974
Based on SAE-740599, "Energy and Synthetic Fuels for Transportation," by R. T. Johnson, HS-016 180.
Availability: See publication

HS-016 159

PRESENT AND FUTURE AUTOMOBILE ANTILOCK BRAKING SYSTEMS

Design features of an antilock braking systems for automobiles are summarized, including induction sensors, electronic control, and brake pressure modulation. It is hoped that the systems under study will lead to one which will cost as much as a good car radio. Future systems include the single-circuit antilock in conjunction with power steering, the three-circuit antilock, and single- and two-circuit antilock for vehicles without power steering. Details are given on the energy sources, system fluids, actuation of rear brake circuits, possible changes needed in power steering design, and the use of a hydraulic pump, the cost of which would not be accepted by the public until the necessity for antilock is recognized or when it is required by government regulations.

Publ: AUTOMOTIVE ENGINEERING v82 n10 p46-9 (Oct 1974)
1974
Based on SAE-741084, "Introduction of Antilock Braking Systems for Cars," by H.-C. Klein and W. Fink.
Availability: See publication

August 29, 1975

HS-016 164

HS-016 160

WHAT'S AHEAD IN AUTOMOTIVE LIGHTING

Two new developments being considered for automotive headlamps are discussed: three-beam headlighting, with a mid-beam to take care of the long-standing driver complaint of overdriving the lower beams; and rectangular headlamps, which will be offered on some 1975 cars, so as to allow certain components to be located more easily on the front end. Among the important factors that must be examined before they can be approved for use are standardization and interchangeability, performance, and safety. It is suggested that the three-beam headlighting would provide better viewing along the lane being traveled and to the right, in a beam pattern having a sharp horizontal and vertical cut-off. The decreased vertical dimension of the rectangular headlamps makes it possible to improve the driver's downward viewing angle, allowing him to view the road closer to the front of the vehicle.

Publ: AUTOMOTIVE ENGINEERING v82 n10 p50-6 (Oct 1974)

1974 ; 3refs

Based on SAE-740615, "Some Effects of Road, Truck, and Headlamp Characteristics on Visibility and Glare in Night Driving," by R. G. Mortimer; SAE-740616, "Future Considerations in Automotive Lighting Design," by R. W. Oyler; and SAE-740617, "Interchangeability of Automotive Headlamps--Rectangular?" by R. H. Hemion.

Availability: See publication

HS-016 161

DESIGNING A SEAT-BELT ELECTRONICS SYSTEM

The design of a complex electronics starter interlock system developed for General Motors' seat-belt system is described. Highlights of the system include: a latch to provide sequence detection and restart memory; input circuits designed to avoid standby battery drain; discrete rather than integrated power devices; and high reliability, assured by providing protection from electrostatic discharge and other electrical transients. Details are given on these features along with seat-bounce protection, bounce timer, output circuits, and power switching devices. Diagrams of the complete interlock system, the integrated circuit, and partitioned functions in logic integrated circuits are given.

Publ: AUTOMOTIVE ENGINEERING v82 n10 p57-61 (Oct 1974)

1974

Based on SAE-741013, "Design of a Seat-Belt Interlock Circuit," by D. E. Houser.

Availability: See publication

HS-016 162

DEATHS DECLINE IN 1973. THE ANNUAL TRAFFIC STORY

Various factors affecting traffic death reductions in 1973 are discussed, including the implications of the energy crisis. Deaths were lower than the previous year's totals in seven of the months, with the largest percentage decrease (19%) in December and the lowest number of deaths (3540) in February. Travel in 1973 continued the increase which has been occurring each year since the end of World War 2. Statistics are

reported on the numbers of vehicles and drivers, the death rate, the turnpike experience, injuries causing disability beyond the day of the accident, regional changes in the U.S., the urban-rural fatality experience, national accident reports, deaths by type of accident, deaths by age of victim, and state and city experience.

by J. L. Recht

Publ: TRAFFIC SAFETY v74 n3 p8-11, 28-9 (Mar 1974)

1974

Availability: See publication

HS-016 163

MOTORCYCLE TASK ANALYSIS

Motorcycle operator tasks were analyzed with the results applied to the development of performance, knowledge, and skill objectives for novice, advanced, and refresher motorcycle safety education programs. Basic control tasks detailed include: pre-operative procedures, starting, accelerating, maintaining balance, controlling direction, reducing speed, stopping, skid recovery, and post-operative behaviors. Tasks related to roadway characteristics include: surveillance, negotiating intersections, interchanges, hills, and curves; lane usage; surface obstructions and hazards; U-turns; and special areas. Tasks related to traffic conditions are: vehicles ahead, behind, oncoming, and from the side; adjacent vehicles; parked vehicles; special vehicles; other motorcycles; and other road users. Those tasks relating to the environment include weather conditions and night operation. Off-road operation tasks are outlined, such as negotiating hills, special surface conditions, and surface obstructions and hazards. Tasks related to the operator include: preparing for motorcycle operation, navigation, use of alcohol and drugs, physical and emotional conditions, licensing, and post-accident responsibilities. Tasks related to the motorcycle include preparation, care and servicing, malfunctions, and registration and inspection. Further tasks are described related to passengers and cargo, including preparation, loading, and operating.

by A. J. McKnight; H. B. Heywood

Central Missouri State Univ., National Public Services Res. Inst.

1974 ; 404p

Prepared for the Motorcycle Safety Foundation, Linthicum, Md.

Availability: Motorcycle Safety Foundation, 6755 Elkridge Landing Rd., Linthicum, Md. 21090 \$10.00

HS-016 164

FACTORS IN THE INITIATION OF BICYCLE-MOTOR VEHICLE COLLISIONS

A total of 888 injury-producing bicycle-motor vehicle collisions were examined. Based on the movements of the vehicles involved, the bicyclists and/or bicycle was probably responsible for the initiation of more than 75% of the collisions. Bicyclist age was strongly related to probable responsibility for the collision. Through age 12, 90% of the bicyclists were probably responsible for the collision; above age 12, probable responsibility decreased in proportion to age and only 34% of the bicyclists age 25 or over were probably responsible. Collisions involving bicyclists in various age groups differed considerably in where, when, and they occurred. The movements of the vehicles primarily involved in the initiation of the collisions

were examined and are discussed in terms of countermeasure planning.

by A. F. Williams
 Insurance Inst. for Hwy. Safety, Washington, D. C.
 1974 ; 41p 26refs
 Prepared in cooperation with Baltimore Police Dept.,
 Maryland Dept. of Motor Vehicles, and Maryland State Police.
 Availability: Corporate author

HS-016 165

A REVIEW OF MARKET PROSPECTS FOR BATTERY ELECTRIC ROAD VEHICLES. PT. 1

The market prospects for battery electric versions of light goods vehicle, urban bus, and private car are reviewed, based on the development of improved batteries. Three particular battery types could have twice, five times, and 10 times the energy density of present lead/acid traction batteries. Conclusions are that the best prospects are for the light goods vehicle and urban bus applications. The private car market is likely to prove difficult to penetrate unless widespread refuelling points are available, or unless there is a serious gasoline shortage leading to very high prices or rationing.

by M. H. L. Waters; J. Porter
 Transport and Road Res. Lab., Crowthorne, Berks. (England)
 Rept. No. TRRL-LR-630 ; 1974 ; 35p 22refs
 Pt. 2 is HS-016 166.
 Availability: Corporate author

HS-016 166

A REVIEW OF MARKET PROSPECTS FOR BATTERY ELECTRIC ROAD VEHICLES. PT. 2

Details are presented of an economic assessment of market prospects for battery electric road vehicles, and some of the more important conclusions are given. The most likely markets for battery electric road vehicles were identified as the light goods vehicle and perhaps some urban buses. Only the advent of a high energy density battery, like sodium-sulphur, is likely to make consideration of the battery electric passenger car worthwhile. Future noise and pollution requirements are unlikely to significantly improve the market prospects of battery electric road vehicles but scarcity or increased cost of oil could well have a more positive effect.

by J. Porter; M. Briggs
 Transport and Road Res. Lab., Crowthorne, Berks. (England)
 Rept. No. TRRL-LR-631 ; 1974 ; 45p 14refs
 Pt. 1 is HS-016 165.
 Availability: Corporate author

HS-016 167

THE LAW AND ROADSIDE HAZARDS

The potential options for legal action, both state and federal, which might lead to a reduction in the losses that follow when a vehicle strays from the highway and encounters a roadside hazard, are identified and analyzed. Roadside hazard is defined as a physical feature of the roadside environment which is such that a vehicle leaving the road surface, even momentarily, can impact with it resulting in unnecessary damage to people or property. They include: rigid non-yielding sup-

ports for traffic control devices and lights; guardrails which can spear cars or otherwise fail to guide a vehicle to a safer environment in the event of impact; bridge railings that are not able to retain an impacting vehicle and redirect it; obstacles in gore areas, bridge abutments, and other hazardous fixed objects; utility poles; trees, ditches, inappropriately steep banks, culverts, rock formations, and similar obstacles. Conclusions are described in terms of: the Federal-Aid Highway Act; the Highway Safety Act of 1966; the federal domain roads; related federal regulatory legislation; pendent jurisdiction; negligence; private and quasi-governmental defendants; proximate and concurrent causation; establishing the standard of care; state statutory duties; roadside hazards as public nuisances; remedies; and answers to defenses.

by J. F. Fitzpatrick; M. N. Sohn; T. E. Silfen; R. H. Wood
 Arnold and Porter, Washington, D. C.

1974 ; 632p refs
 Sponsored by the Insurance Inst. for Hwy. Safety,
 Washington, D. C.
 Availability: Michie Co., Charlottesville, Va.

HS-016 168

ALCOHOL RELATED FATAL MOTOR VEHICLE TRAFFIC ACCIDENT STUDY, MICHIGAN, JANUARY-JUNE 1974

The proportion of alcohol related fatal traffic accidents to all fatal traffic accidents in Michigan was determined and evaluated. Data were collected from all investigated fatal motor vehicle traffic accidents in Michigan during the first six months of 1974. Results of the study fail to develop any new theories or outlooks. Alcohol brings out the worst faults of drivers, compounding the possibility of traffic accidents. Alcohol is identified as the catalyst in most fatal traffic accidents. Young drivers are over-represented in all types and severities of traffic accidents and are shown to be an important factor in alcohol-related crashes. The data indicate that younger drivers drink less than their older counterparts but are much more likely to be involved in crashes when they do drink. The time of day, day of week data dictate the need for more sophisticated methods of scheduling manpower to deal with the accident problem. Specialized traffic training sessions such as identifying the drinking driver, breathalyzer training, and accident reconstruction seminars, are advocated to insure a program of continuing education and to provide information for developing more public awareness. Accident factors tabulated are: fatal accidents and fatalities by drinking condition of drivers, by accident type, by driver age, by month, by hazardous violations committed, by time of day and day of week, and by county. Driver blood alcohol concentration and characteristics of alcohol involvement in Michigan fatal traffic accidents are also given.

Michigan Dept. of State Police, Traffic Analysis Section, East Lansing, Mich.
 1974 ; 21p
 Availability: Corporate author

August 29, 1975

HS-016 173

HS-016 169

COMPARISON OF THREE POINT HARNESS ACCIDENT AND LABORATORY DATA. FINAL REPORT

A combined program of accident investigation, staged collisions, and simulated collisions involving three point harnessed occupants in frontal force collisions has provided a means of correlating injury with forces and/or other physical parameters associated with the injuries. A total of 128 cases involving 169 occupants at barrier equivalent velocities from two to 53 mph were compared with the results from 11 staged collisions and 72 simulated collisions. There were 14 rib cage injuries ranging from single sternum fracture to seven rib fractures at velocities of 10 to 53 mph at injury levels of AIS-2 and -3. A single AIS-4 injury was the most serious injury (a ruptured spleen). The most serious brain injury was an AIS-2. Two cervical vertebra fractures were found, one of which was a 12 year old male and the other a 76 year old female. Only 16 occupants had AIS-3 injuries. No abdominal organ injuries (except the ruptured spleen), thoracic organ injuries, breast injuries, clavicle fracture, or eye injuries were reported, and there were no AIS-5 or fatalities in the sample. It is concluded that: the harness is highly efficient in mitigating injuries; rib and sternum fractures are the most prevalent injuries; submarining is not a major problem; females are injured at lower collision severity than males; age is an important factor in injury susceptibility; and the overall tolerance level for 50% injury level at AIS-3 is 45 mph at an upper shoulder harness load of 1930 lbs, a chest Gadd severity index of 560, and a peak resultant chest acceleration of 85G.

by L. M. Patrick; N. Bohlin; A. Andersson
Wayne State Univ., Detroit, Mich. 48202; Volvo A.B.,
Goteborg (Sweden)

1974 ; 121p 10refs

Supported by the American Safety Belt Council. Prepared for
the Motor Vehicle Manufacturers Assoc., Detroit, Mich.
Availability: Wayne State Univ., Detroit, Mich. 48202

HS-016 170

DESIGN OF ENERGY ABSORBING UPPER TORSO RESTRAINT SYSTEMS

Based on current DOT requirements for a car occupant restraint in car crashes, the load-extension characteristics for an upper torso belt system capable of safely restraining an average motorist in crashes up to 50 mph when worn snugly are analytically determined. The belt characteristics are shown to depend, among other factors, on the total inherent slack in and the permissible displacement of the belt system. Energy absorption is incorporated into the system by means of a mechanical device activated at a specific magnitude of belt load defined by the initial elastic belt elongation.

by E. I. E. Ofodile; J. W. Hannell
Publ: JOURNAL OF ENGINEERING FOR INDUSTRY v96
Ser B n1 p287-93 (Feb 1974)
Rept. No. ASME-73-TEX-1 ; 1974 ; 36refs
Presented at the ASME Textile Engineering Conference,
Charlotte, N. C., 10-12 Apr 1974.
Availability: See publication

HS-016 171

AUTO HEADLIGHTS--TIME FOR A CHANGE

Limitations of current automobile headlights are reviewed, and suggestions for improvement are offered. It is shown that higher light intensity alone is not the total solution to accident reduction, that articulating headlamps are needed to permit drivers to see around curves. Lighting factors that contribute to accident causation are reviewed, and the alternative to automobile lighting improvements, total highway illumination, is evaluated and discounted. The articulating or steering headlamps turn in synchronization to the steering wheel. With them, the limit to turning velocity is automobile dynamics, not lighting.

by J. Finkelman

Publ: LIGHTING DESIGN AND APPLICATION v5 n1 p32-4
(Jan 1975)
1975

Availability: See publication

HS-016 172

PRE-SCHOOL CHILDREN AND THE TRAFFIC LIGHT TASK

The capability of preschool kindergarten children to learn a simulated traffic light task was investigated. It was found that some children under three years of age learned to perform the task, and many of them made no errors. Although performance improved with age, it was concluded that if a child is mature enough to be accepted at preschool kindergarten, he is likely to be able to learn the simulated traffic light task. Data were collected on 260 children attending 10 schools. For each child, the school attended, age, sex, and score were recorded. The scores were used to classify the children as learners or non-learners, and the resultant frequencies are presented in a four-dimensional contingency table.

by G. Avery; R. Wood

Traffic Accident Res. Unit, Dept. of Motor Transport, New
South Wales, Australia 2001

Rept. No. 7/74 ; 1974 ; 36p 18refs

Availability: Traffic Accident Research Unit, Department of
Motor Transport, Box 28 G.P.O., Sydney, N.S.W., Australia
2001

HS-016 173

THE CAPACITY OF YOUNG CHILDREN TO COPE WITH THE TRAFFIC SYSTEM: A REVIEW

Part of a research project designed to develop a set of road-crossing instructions or other training devices, suited to the abilities of pre-teenage road users, is described. The child pedestrian problem is reviewed and a simple road-crossing task is analyzed into its perceptual and judgmental components. Developmental research is examined in terms of: perception, attention, memory, logical reasoning, perception of velocity, time estimation, perception of causality, understanding of rules, socioeconomic level and ability, and reaction time. It is demonstrated that performance of many tasks improves with increasing age. Generally, developmental trends in road-crossing abilities are a function of inadequate strategies

for acquiring information and in lack of experience in discriminating between relevant and irrelevant cues.

by G. C. Avery

Traffic Accident Res. Unit, Dept. of Motor Transport, New South Wales, Australia 2001.

Rept. No. 8/74 ; 1974 ; 37p 85refs

Availability: Traffic Accident Research Unit, Department of Motor Transport, Box 28 G.P.O., Sydney, N.S.W., Australia 2001

BIKEWAYS. STATE OF THE ART. 1974. FINAL REPORT

Results are presented of initial experiences in various localities regarding bicycling regulation enforcement, development of bikeway locational and design criteria, and provision of physical facilities. This state-of-the-art report focuses on planning and design practices employed to date, reviews their successes and failures, outlines practices which appear to contribute to bicycle facility utility and safety, and identifies design pitfalls. Bicycle facility terminology is discussed, including bikeway classification, definitions, bike routes and lanes, protected lanes, sidewalk treatments, and independent pathways. Bicycle facility design standards are investigated in relation to bicycle facility dimensional requirements, design speed and related parameters, bikeway capacity, grades, and pavement specifications. Intersections are detailed, including: bike left-turn lanes; conflicts with right-turning motor vehicles; countermeasures to turning problems; isolated (mid-block) crossings; grade separations; sidewalk bikeway intersection interface; unsignalized, offset, and signalized intersections; vehicle encroachments at intersections; freeway ramps and turning lanes; and bi-directional operations at intersections. Bikeway graphics are examined, including route signing; bike, pedestrian, and roadway crossing signs; sign placement; lane demarcation; and pavement message markings. Design pitfalls noted are planners perspective, transition areas, continuity, locational aspects, bus routes, current user data, location and design selection criteria, drainage grates, bikeway maintenance, rail crossings, and education and enforcement relative to physical planning. An appendix gives cyclists' own perceptions on such aspects as: on-street lanes; lane width; lane position and its safety features; and sidewalk bikeways and their safety features.

by D. Smith, Jr.

DeLeuw, Cather and Co., 120 Howard St., San Francisco, Calif. 94120

Contract DOT-FH-11-8134

Rept. No. FHWA-RD-74-56 ; 1974 ; 103p 38refs

Availability: NTIS

A CRITICAL APPRAISAL OF THE APPLICABILITY OF BENEFIT-COST ANALYSIS TO HIGHWAY TRAFFIC SAFETY

Conceptual problems regarding the applicability of benefit-cost analysis to highway traffic safety measures are examined in order to illustrate the practical problems of estimating benefits and costs, and to show to what extent benefit-cost analysis can be applied in a useful way to traffic safety problems. Details are given on: the effects of traffic safety measures; projecting the effects of safety measures; benefits of accident

loss reduction measures; quantifying the economic losses; economic losses due to traffic fatalities and injuries; property damage cost; other accident costs; quantifying the non-economic benefits; benefits of traffic accident reductions; the cost of safety measures; and the decision structure. It is concluded that the results of conventional benefit-cost analyses as applied to traffic safety problems should be interpreted with great caution before any conclusion on the worth, or lack of it, of a traffic safety measure can be drawn, for the following reasons: estimates of the effects of safety measures are subject to considerable uncertainties; injury severity reduction is measured only in very gross terms; economic benefits of injury severity reduction cannot be estimated under the present state of the art; no satisfactory information exists on the non-economic value of life saved in the future to that of a life saved now; and the net economic cost of vehicle safety features and some highway projects are conceptually difficult to determine. Considering the great role of uncertainty and of not directly comparable benefits, decision analysis appears to be a more promising tool for the selection of traffic safety measures than conventional benefit-cost analysis.

by H. C. Joksch

Center for the Environment and Man, Inc., 275 Windsor St., Hartford, Conn. 06120

Contract RA-72-2

Rept. No. CEM-4127-489a ; 1974 ; 52p 54refs

Prepared for the Insurance Inst. for Hwy. Safety, Washington, D. C.

Availability: Corporate author

THE DRINKING AND DRIVING CAMPAIGN. DECEMBER 10-31, 1973

The drinking-driving campaign was a pilot project aimed at gathering information and developing organizational strategies for a future comprehensive program on drunk-driving. The campaign employed various means of alerting the public to the dangers of and alternatives to driving while impaired. Implementation of the campaign stressed citizen involvement and community action to deal with the problems, based on the assumption that individual communities are best able to recognize local problems and to implement countermeasures consistent with their particular situations. Campaign activities include advertising materials such as billboards, radio and newspaper ads, question and answer news releases, extended bus services, screenings of films on drinking and driving, TV and radio programs, local placement of campaign materials, and contributions of paid advertising. Analysis of a telephone survey results showed that the 1973 Christmas drinking-driving campaign reached a significant proportion of the people in nine Ontario cities. Public awareness of drinking-driving laws improved as a result of the campaign and there was some increase in the number of people who reported that they decided not to drive home after drinking too much. Public interest and enthusiasm were generated through the innovative approaches taken by the campaign committees, such as panel shows, "drink-ins", and party buses. Organizational strategies were formulated which may increase the effective coordination between government agencies and local communities in future attempts to solve the drinking-driving problem.

Safety Res. and Devel. Section, Ministry of Transportation and Communications, Ontario, Canada

1973 ; 29p

Prepared in cooperation with the Addiction Res. Foundation of Ontario.

Availability: Corporate author

August 29, 1975

HS-016 180

HS-016 177

TRACTION-ABRASION RELATIONSHIPS OF TREAD COMPOUNDS CONTAINING NEW REINFORCING BLACKS

Abradability and braking force coefficient (BFC) were determined on compounds of various elastomers and fillers, using a modified Lambourn abrader. Butyl rubber showed the highest BFC and butadiene rubber the lowest, with SBR intermediate. While the effect of carbon black type is not as large, certain types of carbon black imparted not only improved traction ("wet" BFC) to tread compounds but also increased wear resistance, in contrast to other methods of improving traction which invariably lead to lower abrasion resistance. The laboratory relationship was confirmed on actual tires on a special trailer and on a test fleet car.

by B. B. Boonstra

Publ: TIRE SCIENCE AND TECHNOLOGY v2 n4 p312-29
(Nov 1974)

1974 ; 3refs

Sponsored by the Cabot Corp., Billerica, Mass. Presented at a meeting of the Rubber Div., American Chemical Society, Denver, Colo., Oct 1973.

Availability: See publication

HS-016 178

IMPACT PERFORMANCE AND A SELECTION CRITERION FOR TEXAS MEDIAN BARRIERS. EVALUATION OF THE ROADWAY ENVIRONMENT BY DYNAMIC ANALYSIS OF THE INTERACTION BETWEEN THE VEHICLE, PASSENGER, AND THE ROADWAY

Determination was made of the impact performance of the Texas Metal Beam Guard Fence median barrier (MBGF) and a comparison of its performance with that of the Texas Concrete Median Barrier (CMB). The MBGF consists of two standard W-shaped guardrails mounted back-to-back on a 6 WF 8.6 support post whereas the CMB is a solid concrete barrier. The impact performance of the MBGF was determined from a combination of crash tests and from crash simulations by the Highway-Vehicle-Object-Simulation-Model (HVOSM). A close comparison of test and simulated results verified the accuracy of the HVOSM in simulating impacts with the MBGF. The impact performance of the CMB was obtained from another study. Inspection of 135 median barrier impacts on various urban freeways in Texas were made to determine the distribution of impact angles. These field measurements, supplemented by data from the HVOSM, provided impact angle probabilities as a function of median widths. The final product of this study was a selection criterion which provides an objective means of comparing the impact severity of the MBGF and the CMB as a function of the median's dimensions.

by H. E. Ross, Jr.

Texas Transportation Inst., Texas A and M Univ., College Station, Tex.

Rept. No. RR-140-8 ; 1974 ; 128p 11refs

Sponsored by the Texas Hwy. Dept. in cooperation with the U. S. Dept. of Transportation, Federal Hwy. Administration.

Availability: Corporate author

HS-016 179

HYDRAULIC LOW COST SKID CONTROL SYSTEM. INTRODUCTION

A hydraulic skid control system is described which is designed as a low cost, reliable system for passenger cars and light trucks, to be attractive enough to sell as an option. It meets all the requirements set by the major automobile manufacturers. As promoted for passenger cars, the system will cost \$27.03 in annual quantities of 10,000. This cost includes all required fail safe protection, wiring harness, assembly cost, and fuse protection. A car equipped with the system will stop shorter under all road conditions and maintain directional stability with no wheel lock down to 5 mph. Features of the system are: the brake pressure modulator is mounted under the hood and is powered by a solenoid only; the pressure and volume capacity of a single modulator can accommodate any size car; the pressure modulator is miniature, and exhibits a constant brake pressure build at low and high pressure; and the sensors are active sensors and operate with a gap to the exciter wheel of .200 in. which allows a non-adjustable mounting.

by C. Adahan

Carmeli Adahan, 1930 Vine St., No. 303, Berkely, Calif. 94709
1974 ; 25p

Includes U. S. Patent No. 3,847,449, "Solenoid Powered Brake Pressure Modulator", and U. S. Patent No. 3,811,526, "Rate of Change of Velocity Control System".

Availability: Corporate author

HS-016 180

ENERGY AND SYNTHETIC FUELS FOR TRANSPORTATION: A SUMMARY

Synthetic or substitute fuels being considered for transportation uses are reviewed in a survey which includes a brief report of current energy use patterns in the transportation sector and a projected future for the automobile and other transportation modes. Specialized needs for the transportation sector are described including attributes of the ideal fuel. Discussion of possible synthetic fuel candidates is broken down into categories: hydrocarbons, hydrogen, inorganic hydrogen compounds, and electrochemical systems; general properties are given. The properties of an idealized synthetic fuel are formulated and correlated with the properties of the ideal transportation fuel, and an extension comparison of the selected synthetic fuel candidates is made. A significant portion of this comparative information is presented in graphical and tabular form with appropriate discussion of the data and its presentation. A discussion of the application potentials of the various synthetic fuel candidates to various modes is given. Interim and long-term fuel possibilities are proposed for further consideration.

by R. T. Johnson

Department of Mechanical and Aerospace Engineering, Univ. of Missouri, Rolla

Grant NASA-NGT-44-005-114

Rept. No. SAE-740599 ; 1974 ; 12p 55refs

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974. Sponsored by NASA and the American Society for Engineering Education.

Availability: SAE

HS-016 181

AUTOMATIC IDENTIFICATION OF MOTOR VEHICLE ACCIDENT LOCATIONS

A quick and reliable system developed in Rhode Island to identify the locations of accidents and to detect high accident locations is described. The accident records processing scheme designed for the Rhode Island Department of Transportation depends on two basic items: two files with alphabetic descriptions, one of the accident location, the other of a street and highway system. The accident data file also contains information which describes accident conditions, driver characteristics, occupant information, vehicle action, and vehicle damage. The geographic base file used is known as the DIME/GBF (Dual Independent Map Encoding/Geographic Base File), which makes it possible to locate accidents on all streets in the state rather than on state highways only. A matching of these two basic files results in an output of records containing accident data, geographic description in terms of city or town, census tract, census block, road segment, and X-Y coordinate. The end result of the accident records processing scheme is a series of computer tabulations describing accidents, their locations, and the conditions under which they occurred. The reports are oriented toward the traffic engineer whose duty it is to evaluate the need for improvement of highway design features, hazardous pedestrian locations, traffic operation controls, and highway maintenance.

by J. F. Arruda; C. C. Crevo; J. M. Manning
Publ: TRAFFIC ENGINEERING v45 n1 p11-4 (Jan 1975)
1975

Availability: See publication

HS-016 182

CALIFORNIA BICYCLE ACCIDENTS--THEIR RELATIONSHIP TO ENFORCEMENT AND EQUIPMENT FACTORS

California bicycle accidents are examined in terms of trend, equipment factors, riders, and bikeway systems. A Bicycle Enforcement Program was evaluated in terms of bicycle accident reduction. It was found that bicycle accidents in 1973 numbered 2900 fewer than expected based on a four-year trend. Statewide, fatal, and injury bicycle accidents significantly decreased. Bicyclists under age 15 were involved in 60.7% of all bicycle accidents, and bicycles involved in accidents were less likely to be equipped with chain guards than were bicycles in the general population. The bikeway accident rate (accidents on bikeways per mile of bikeway) was slightly lower than roadway accident rates (accidents per mile of road). Bicycle accidents decreased in the departmental zones which recorded the greatest increase in enforcement actions. Repetitive bicycle violators violated the same rules-of-the-road as the one-time bicycle violators.

California Hwy. Patrol, Analysis Section

1974 ; 48p

Availability: Department of California Highway Patrol, P.O. Box 898, Sacramento, Calif. 95804

HS-016 183

OPTIMIZATION OF DYNAMIC RESPONSE OF COMPLEX VEHICULAR STRUCTURES

Optimum design of the dynamic response of vehicular structures is considered. A generalized steepest descent method is developed which integrates the equations of motion of the system, and a general theory is then applied to a two degrees of freedom model with damping. The objective function for the problem consists of peak velocities and accelerations during a specified time interval. Since analytic solutions of equations of motion are not known, an expression for a peak response cannot be written in terms of the design variables. The maximum values of various functions are expressed as norms in the L-p space. Two techniques of expressing the constraints on the response quantities are tried, one of which worked quite satisfactorily. In this technique, the bounds on the response quantities are treated as functional constraints. The results obtained for it are presented and discussed.

by J. S. Arora; M.-H. Hsiao
Department of Mechanics and Hydraulics, Univ. of Iowa,
Iowa City, Iowa 52242
Contract DAAFO3-69-C-0014
Rept. No. R-48 ; 1973 ; 49p 9refs
Part of Project Themis, "Vibration and Stability of Military and Other Complex Vehicular Systems". Sponsored by the Army Weapons Command, Rock Island, Ill.
Availability: Corporate author

HS-016 184

OPTIMIZATION OF DYNAMIC RESPONSE OF MECHANICAL SYSTEMS

A class of dynamic response optimization problems, involving forced and transient response of mechanical systems, is formulated in a state space setting. Extreme, or maximum valued cost functions and performance constraints are employed in formulation of the design problem. Three approaches for reducing the problem to the state space form of applied optimal control theory are presented and evaluated through solution of a vehicle dynamic response optimal design problem. Two of the methods are shown to provide reliable problem solution.

by M. H. Hsiao; E. J. Haug, Jr.; J. S. Arora
Contract DAAFO3-69-C-0014
Publ: ASME DESIGN TECHNOLOGY TRANSFER CONFERENCE (1ST) PROCEEDINGS p147-52 (Oct 1974)
Rept. No. ASME-74-DTT-16 ; 1974 ; 11refs
Conference held 6-9 Oct 1974 in New York. Sponsored by Project Themis, Iowa Univ., Iowa City.
Availability: See publication

HS-016 185

MIRROR SIZE REQUIREMENTS FOR PROPOSED NEW VISION TARGETS

Mirror size requirements for both passenger cars and trucks are determined by a proposed set of indirect vision target requirements. The mirror size information resulting could be valuable in determining the effects of proposed automotive safety standard requirements in the area of indirect visibility. It was proposed that the target requirements be visible ambinocularly from a point corresponding to the rear of the 95th

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percentile eye ellipse. With a given field of view target requirement the mirror size required is most sensitive to the geometrical eye to mirror relationship, which varies for each of the different passenger cars and trucks. It was necessary to establish a limited base of data which represented the eye to mirror relationships for representative cars and trucks. This was accomplished by actually making measurements of several cars and trucks. Computer predicted mirror sizes are shown both pictorially and graphically. It was found that left hand outside mirror size is highly sensitive to head turn convention and eye position. The head turn convention which yielded the smallest mirrors was the one requiring pivot point translation and head rotation only. Typical mirror sizes were less than 7 in wide except in the extreme case of a large car. It seems that maintaining a head turn less than 60° would be reasonable. A 14-15 in. inside mirror is seen to be adequate, as well as a 7-10 in. right hand convex mirror for almost all cases.

by L. Hagberg; D. Butterman
Donnelly Mirrors, Inc., Holland, Mich. 49423
1974 ; 37p
Availability: Corporate author

HS-016 186

THE EFFECT OF CONVEX MIRROR DISTORTION ON ACUITY AND SIZE DISCRIMINATION TASKS

Six 3 X 5 in. convex mirrors of varying optical quality were tested under simulated twilight conditions for accuracy and reaction time on acuity and size discrimination tasks. Subjects were 12 male and female college students ages 17 to 21 and 12 employed males and females between ages 45 and 62. Sex yielded a minor difference; older subjects worked more slowly and made more errors. The first-surface mirror with good cosmetic appearance was best for the size discrimination task; the first-surface mirror with fair cosmetic quality was best for the acuity task. The results were discussed in regard to rear-view vision with a convex mirror positioned on the right-front fender of a car.

by P. Van Eyl
Donnelly Mirrors, Inc., Holland, Mich. 49423
1974 ; 50p
Availability: Corporate author

HS-016 187

AUTOMOTIVE CONVEX MIRRORS--OPTICAL PROPERTIES

A series of detailed calculations relating to automotive (including truck) use of left and right outside convex mirrors are presented. A review of the human visual task and a discussion of the methods of calculation are presented. The primary calculations center around a standard large automobile configuration with two targets that simulate the cross section of an automobile in adjacent lanes and at distances behind the driver of 13 and 30 ft. Quantities defined and calculated are apparent magnifications, gains in field of view, absolute field of view, driver head-turns, binocular and monocular fields of view, accommodation ability redundant as a function of age, near points required for clear vision, eye divergence angles, and mirror quality relative to binocular vision. Calculations were performed for 30-, 40-, 60-, and 80-in. mirrors for a number of positions on both the left and right sides. Truck calculations centered around a standard large truck cab and a

trapezoidal ground target. Optimum radii of curvature and mirror shapes to see this target are discussed along with perspective views of the target. It is recommended that, for convex mirrors in the 30-80 in. radius range, the nearer locations for convex mirrors on both the left and right hand sides should be used with caution. For the right hand side, it is recommended that a convex mirror of 50 in. radius minimum should be placed at least 40 in. forward of the driver's eyes, measured along the longitudinal axis of the automobile. A number of configurations are recommended on the left hand side, with a convex mirror 60 in. in radius, placed 50 in. forward of the driver, a representative configuration.

by J. Seeser
Donnelly Mirrors, Inc., Holland, Mich. 49423
Rept. No. TR-201 ; 1974 ; 59p 12refs
Availability: Corporate author

HS-016 188

A NEW APPROACH IN DRIVER TRAINING

A new approach to high school driver training classes in California is described. The driving ranges, in operation since July of 1973, consist of about a third of an acre of unused land at each school, which has been blacktopped and striped with lanes, a variety of intersections, and forced turns. The course can be modified by the instructor to introduce a variety of situations, and the length of the course can be altered from one-tenth to one-third of a mile. Small foreign cars are used, and 10 cars can be on the range at any one time. The students can practice without being distracted by traffic or pedestrians. Each spends two hours a day for six days on the range, progressing each day from very simple to reasonably complex situations. Points of conflict are identified and all kinds of maneuvers can be taught. The students graduate to larger cars and street driving after the 12 hours on the driving range. The benefits of the program in general are reviewed along with economic benefits over using driving simulators.

by R. Bauman
Publ: CALIFORNIA HIGHWAY PATROLMAN v38 n11 p4-5, 20, 23 (Jan 1975)
1975
Availability: See publication

HS-016 189

AUTOMOBILE INSURANCE LOSSES. COLLISION COVERAGES. VARIATIONS BY MAKE AND SERIES, 1973 MODELS DURING THEIR FIRST TWO YEARS. RESEARCH REPORT

Variations are reported in both the frequencies and sizes of claims for damage to 1973 model year private passenger vehicle of 12 domestic makes and one foreign make during their first two years of availability. The report is based on data from collision coverages, that is insurance covering damage to the insured vehicle itself, supplied by seven insurance companies: Allstate, The Home, Kemper, Liberty, Nationwide, State Farm, and Travelers, for the period September, 1972, through September, 1974. Assigned risk, fleet policies, and all data from Massachusetts were excluded. Vehicle Identification Numbers (VINs) were used to derive the specific vehicle types for which results are presented. Only data with valid VINs were used for this report. Results show that claim frequencies ranged from a low of 7.0 to a high of 17.0 claims per 100 in-

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sured vehicle years, average loss payments per claim ranged from a low of \$330 to a high of \$1,101, and average loss payments per insured vehicle year ranged from a low of \$26 to a high of \$164. Data are presented in tabular form and analyzed.

Highway Loss Data Inst., Watergate 600, Washington, D. C. 20037

Rept. No. HLDI-R73-3 ; 1974 ; 185p

See also HS-013 905, 013 934, and 014 585. Sponsored by the Insurance Inst. for Hwy. Safety.

Availability: Corporate author

HS-016 190

AN ATTEMPT TO MEASURE AND CHANGE DRIVERS' ATTITUDES AND BEHAVIORS TOWARD SEATBELT USE

The aims of this study were: to develop an attitude questionnaire and an unobtrusive behavior measure technique which were both sensitive and administratively useful in repeated assessment of attitudes and behaviors related to seatbelt use, and to develop and test the effectiveness of different persuasive communications on seat belt attitudes and behavior. The primary emphasis was on the attempt to obtain increased use of seatbelts as determined by direct observation of behavior. After baseline measures were obtained, subjects (drivers who had seat belts available, but were directly observed to be not using them) were randomly assigned to one of five groups: group 1, no persuasive letter control group that received both a pretest and posttest attitude questionnaire; group 2, pretest control group that received no pretest questionnaire, but did receive a persuasive letter and posttest questionnaire; group 3, persuasive letter group that received the pretest and posttest questionnaires; group 4, persuasive letter group that was requested to sign a commitment pledge and received the pretest and posttest questionnaires; and group 5, persuasive letter group that was offered a financial incentive of \$10.00 if a commitment pledge to wear seat belts was signed. Attitude measures were obtained 14 days before and 14 days after the persuasive communication. Observations of behavior occurred 21 days, 14 days, and one day before and one day, three days, seven days, and 14 days after the persuasive communication. A change was demonstrated in seat belt behavior for drivers in experimental groups 2-5 combined as compared to the control group 1. Also, drivers in group 5 evidenced greater seat belt use than drivers in groups 2-4 combined. Even though behavior changes found were statistically significant, because they were sporadic and small, they were not administratively significant at the present time. The behavior changes evidenced do, however, offer encouragement to investigators concerned about the possibilities of developing more effective persuasive communications in the future. No meaningful conclusions about attitude changes could be stated.

by W. Butynski

University of Vermont

Publ: Xerox University Microfilms, Ann Arbor, Mich., 1973 ; 179p 140refs

Doctoral dissertation.

Availability: See publication

HSL 75-8

HS-016 191

VISIBILITY PILOT RESEARCH (PHASE 1). FINAL REPORT

An experimental design is proposed to determine dynamic eye location distribution characteristics. This design will provide the following information: the relationship of static anthropometric measurements to dynamic eye location; the difference between dynamic on-the-road eye location vs. static in-the-lab eye location distributions; the effect of different types of vehicle seating parameters on eye location; and a validation of previous static eye location studies. The data obtained from the proposed experimental design could be used to verify or replace the SAE Ellipses. It would also allow for the development of a mathematical model that will describe eye positions during the driving task as a function of package variables, driver anthropometry, and target viewing angles.

by J. M. Miller; S. M. Gatchell

Michigan Univ., Ann Arbor

1974 ; 40p 21refs

Sponsored by the SAE Vehicle Res. Inst.

Availability: SAE

HS-016 192

MILEAGE CRASH RATES FOR CERTAIN CAR MAKE AND MODEL YEAR COMBINATIONS: A PRELIMINARY STUDY

Using North Carolina accident, registration, and motor vehicle inspection data, crash rates per million vehicle miles are derived for several model years of each of 30 common makes of passenger cars. Single vehicle and injury crash rates are also examined for these same makes. Certain adjustments for recycled odometers are made at the outset. The major finding is that the overall crash rates within makes show a stable, ubiquitous tendency for each newer model to have a crash rate lower than the previous model year. Overall crash rates for the oldest vehicles are generally about two-and-one-half times greater than their newest counterparts (i.e., six model years later). Within a given model year, there do not appear to be large differences either within a given market class or among the various market classes. The single vehicle and injury crash rates resemble the overall crash rates but are somewhat more variable. Recommendations are made for obtaining exposure information through state motor vehicle inspection programs.

by D. W. Reinfurt; B. J. Campbell

University of North Carolina, Hwy. Safety Res. Center, Chapel Hill

1974 ; 64p 2refs

Sponsored by the Insurance Inst. for Hwy. Safety and by the North Carolina Governor's Hwy. Safety Program.

Availability: Corporate author

HS-016 193

TEEN-AGE DRIVER ACCIDENT STUDY 1973

Statistics are presented in tabular form on traffic accidents involving adolescent drivers in the state of Washington. They cover: three-year teenage driver totals; age of teenage drivers; information on teenage drivers in accidents in 1973; teenage driver violations, 1971-1973; teenage driver accidents by county; three-year comparison of time of day and day of week when accidents and fatal accidents involving teenagers oc-

August 29, 1975

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curred; accidents by month involving teenage drivers; accident analysis; type of accident; accident locations; vehicle characteristics of teenage drivers' vehicles; and conditions under which teenage driver accidents occurred.

Washington State Patrol

1974 ; 14p

Availability: Corporate author

HS-016 194

PLANNING AND DESIGNING FOR THE PEDESTRIAN ENVIRONMENT

Problems relating to pedestrian circulation are discussed, and the importance of walking as a means of transportation is emphasized. It is shown that pedestrian design must consider human convenience and design environment, and that pedestrian level of service should be based on freedom to select speed, ability to pass slow walkers, and ease of cross and reverse flow at pedestrian traffic concentrations. Pedestrian traffic characteristics to be considered include handicapped pedestrians, magnitude and duration of peaks, surging of platooning due to traffic lights and transit arrivals, and economic ramifications of space used. Examples of various levels of service are described, as well as queuing situations, walkways, and stairways. Examples are given from New York City, and London and Stevenage, England.

by A. R. Ameruso

New York City Dept. of Highways

Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN PROCEEDINGS OF THE SEMINAR, New York, 1974 p204-20

1974 ; 2refs

Seminar held at Walt Disney World, Fla., 12-14 Dec 1973.

Availability: See publication

HS-016 195

DATA COLLECTION TECHNIQUES--TIME-LAPSE PHOTOGRAPHY

Time-lapse photography use in pedestrian counting when the movements of pedestrians were too complex or the quantity of pedestrians too numerous for direct manual counts is discussed. Its effectiveness in volume counts, density, rate-of-flow, and identification of conflicts is noted, and its advantages and disadvantages are reviewed. Procedures for and examples of pedestrian surveys are described, including studies in Newark, New Jersey; an evaluation of the 3M Dynamic Pedestrian Signal; and the New York City garment center urban goods movement study. The time-lapse photography is being used to record and monitor a variety of street activities, including: curb utilization; intersection activity; lane blockage; speed and delay; and through and local traffic. Through the analysis of these observations, conflicts between pedestrians, cars, trucks, and hand trucks can be quantified, and standards can be developed against which subsequent intersection or roadway improvements in the area can be compared. Information gathered could be incorporated into the measurement of differences between varying degrees of free and restricted movement, leading ultimately to prediction of man-hours lost

or other related consequences of congestion and pedestrian/vehicle conflicts.

by P. W. Miller; W. H. Kraft
Edwards and Kelcey, Inc.

Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p221-36

1974

Seminar held at Walt Disney World, Fla., 12-14 Dec 1973.

Availability: See publication

HS-016 196

COSTS AND BENEFITS OF REDUCING BICYCLISTS' EXPOSURE TO ROAD-SIDE AIR POLLUTION

Research on the costs and benefits of reducing the roadside air pollution hazard for cyclists is discussed in an attempt to provide bike route planning guidelines. The biomedical literature is reviewed which indicates that increased mortality rates are associated with high levels of air pollution. Related diseases include bronchitis, lung cancer, and cardiovascular diseases. Social costs and benefits of reducing the pollution are shown to be difficult to measure, although rough estimates are possible. A methodology and basic data for generating such estimates are presented, with sensitivity analysis showing wide ranges in the values which yield generally compatible planning guidelines. They deal with suburban bike routes, bike routes in congested areas, and signing low volume streets. It is concluded that the benefits of reducing roadside air pollution for cyclists may exceed the costs where bike route usage rates are high. Where usage is low, the economic justification for major construction such as a separate trail on the outer edge of the right-of-way or through a non-traffic corridor is much less certain unless other benefits such as recreation and exercise can be included. Use of low volume residential streets linked up along busier streets with separate trails and lanes can be justified even with low usage rates.

by M. Everett

University of Southern Mississippi, Box 72, Hattiesburg, Miss. 39401

Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN PROCEEDINGS OF THE SEMINAR, New York, 1974 p352-63

1974

Seminar held at Walt Disney World, Fla., 12-14 Dec 1973.

Availability: See publication

HS-016 197

SAFETY ASPECTS OF BICYCLE TRANSPORTATION

The worsening trends in bicycle injuries and deaths suggest a need to examine more closely the nature and severity of bicycle accidents, and to explore the efficacy of possible countermeasures to reduce bicycle accident losses. Graphs are presented to illustrate the trends, and pre-crash programs for accident avoidance are discussed. A 16-item Bicycle Riders Safety Code is included, along with a list of objectives for an on-going educational program. Methods of injury reduction and severity reduction are also described. It is concluded that reversal of the bicycle accident trends may require a long, comprehensive, and balanced bicycle safety program aimed at

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HSL 75-8

the automobile driver, the bicyclist, his bike, and the riding environment.

by P. H. Wright; A. T. Germano; R. G. Hicks
Georgia Inst. of Tech.; Parsons-Brinkerhoff-Tudor-Bechtel
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN
PROCEEDINGS OF THE SEMINAR, New York, 1974 p368-
82
1974 ; 14refs
Seminar held at Walt Disney World, Fla., 12-14 Dec 1973.
Availability: See publication

HS-016 198

THE DANGERS OF PARALLEL-BAR SEWER GRATES TO BICYCLISTS

The dramatic increase in the popularity of bicycling has brought the danger of parallel-bar sewer grates more prominently into the public eye. Many parallel bar grates have bars spaced just wide enough to catch the wheels of most bicycles and force them to stop abruptly and violently, often throwing the rider from his or her bike. The extent and severity of the problem is reviewed along with reasons for the incorporation of these grates into the roadway design. Viable solutions to the problem are described, including restrictive legislation, modification of existing grates with welded mesh wiring or cross-bars, painting the grates and the surrounding curb, and erecting signs to warn bicyclists. Efforts to put the solutions into use in various states are reported. It is concluded that bicyclists should make sure that these changes are enacted by pressuring state and federal highway officials at every level. Specific injuries resulting from bicycle wheels falling into these sewer grates are listed, and correspondence relating to this problem is appended.

by D. Whitman
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN
PROCEEDINGS OF THE SEMINAR, New York, 1974 p383-
410
1974
Seminar held at Walt Disney World, Fla., 12-14 Dec 1973.
Availability: See publication

HS-016 199

RECENT PROGRESS IN DUAL-MODE BICYCLE TRANSPORTATION

Use of the bicycle as a basic part of the transportation system of the U.S. is discussed, with emphasis on bicycle incorporation into public urban and interurban mass transit. The use of bicycles in a dual-mode (bikes-aboard-transit) system is explored, in which the bikes are carried in a special quick-loading bicycle trailer which is designed to be towed by a bus. Design requirements for the bike rack were established, and a bike rack suitable for public transit use on a bike trailer was designed and built. The rack is simple, fast, and easy to load, holds all common sizes and types of bike, has high security, and has positive clamping which prevents any damage to bikes during transit. A preliminary survey to assess the demand for

bicycle-bus-trailer service was performed and the results are presented.

by D. M. Eggleston
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN
PROCEEDINGS OF THE SEMINAR, New York, 1974 p616-
44
1974 ; 4refs
Sponsored by the California Dept. of Transportation. Seminar held at Walt Disney World, Fla., 12-14 Dec 1973.
Availability: See publication

HS-016 200

HAS ASAP FAILED?

The Alcohol Safety Action Project (ASAP) is evaluated as it functions during the last months of its four-year life. The controversy surrounding its effectiveness is put into perspective, with factors emphasized which have not appeared in existing evaluations. It is suggested that the ASAP concept is at least successful enough to warrant thorough examination. It is noted that ASAP is an experimental concept, not a demonstration project, and not a national program but a series of local projects conducted nationwide. ASAP has conclusively demonstrated that alcohol-safety demonstration programs depend totally on community structures, and it has successfully shown that alcohol-safety projects need more time. It is further shown that alcohol safety is a social problem, not a highway safety problem. ASAP has greatly benefited the nation's lower courts, and is having a major impact on alcohol-treatment attitudes. It is stressed that highway safety regarding alcohol abuse is a long-term problem that cannot be solved in three years. ASAP has created a new reservoir of skilled manpower to combat the problem, and is a long-term, cooperative, large-scale multi-agency social action program which warrants subtlety and caution from both those implementing and evaluating it.

by G. J. Scrimgeour
Publ: TRAFFIC SAFETY v75 n2 p16-8, 34-6 (Feb 1975)
1975
Availability: See publication

HS-016 201

MOTOR CARRIER ACCIDENT INVESTIGATION. WESTINGHOUSE ELECTRIC CORPORATION AND HALIFAX COUNTY VIRGINIA SCHOOL BOARD (SCHOOL BUS) ACCIDENT--MARCH 28, 1974-- SOUTH BOSTON, VIRGINIA

An accident investigation report is presented concerning a tractor trailer combination, school bus, and two private automobiles, a Chevrolet and a Ford, involved in a rear end collision which resulted in two fatalities, 37 injuries, and \$65,000 property damage. The two cars were stopped behind the school bus discharging passengers. The truck struck and overrode the Chevrolet from behind, shoving it under the school bus, which overturned and rolled onto its roof. The truck then collided with the Ford. The probable accident cause was identified as inattention, fatigue, and excessive speed by the truck driver. Photographs are included.

Bureau of Motor Carrier Safety, Washington, D. C.
Rept. No. BMCS-74-2 ; 1974 ; 16p
Availability: Corporate author

August 29, 1975

HS-016 206

HS-016 202

BICYCLE TRANSPORTATION

Bicycle use is discussed as a practical transportation alternative in the U.S. and foreign countries today. Increases in bicycle usage are reported. Advantages of bicycle travel are given as beneficial exercise, mobility, convenience, and low cost. Major deterrents are cited, including high accident rates, bicycle thefts, exposure to automotive air pollutants, insufficient support facilities (i.e., lack of bikeways, secure parking facilities, showers at places of work), and bad weather conditions. It is noted that the accident rate is growing at about 15% per year, with most accidents involving collisions with automobiles. In 66% of these cases the cyclist violated a law or safety rule. The vast majority of bicycle accidents involve children, although the proportion of accidents involving adults is climbing. Federal activities, policies, and legislation are reviewed, along with state and local activities, and experiences in Europe, Japan, and the People's Republic of China. General recommendations are given.

by N. Dougherty; W. Lawrence
Environmental Protection Agency, Office of Planning and Evaluation, Washington, D. C.
1974 ; 77p 52refs
Availability: GPO \$0.95

HS-016 203

AUTOMOBILE INSURANCE LOSSES. COLLISION COVERAGES. VARIATIONS BY MAKE AND SERIES, 1974 MODELS DURING THEIR FIRST YEAR

Variations in both the frequencies and sizes of claims for damage to 1974 model year private passenger vehicles of 12 domestic makes and six foreign makes during their first year of availability (September, 1973 through September, 1974) are given. The report is based on data from collision coverages, that is insurance covering damage to the insured vehicle itself, supplied by eight insurance companies: Allstate, The Home, Kemper, Liberty, Nationwide, Prudential, State Farm, and Travelers. Specific vehicle types for which results are presented were derived from Vehicle Identification Numbers (VIN's). Only data with valid VIN's were used. Results show that claim frequencies ranged from a low of 5.3 to a high of 17.9 per 100 insured vehicle years, average loss payments per claim ranged from a low of \$351 to a high of \$1,090, and average loss payments per insured vehicle year ranged from a low of \$26 to a high of \$160. Data are presented in tabular form and analyzed.

Highway Loss Data Inst., Watergate 600, Washington, D. C.
20037
Rept. No. HLDI-R74-2 ; 1974 ; 149p
See also HS-013 905, 013 934, 014 585, and 016 189. Sponsored by the Insurance Inst. for Hwy. Safety.
Availability: Corporate author

HS-016 204

SUMMARY OF NATIONAL TRANSPORTATION STATISTICS. FINAL REPORT

A compendium of selected national-level transportation statistics is presented. Included are cost, inventory, and performance data describing the passenger and cargo operations of the following modes: air carrier, general aviation, automo-

bile, bus, truck, local transit, rail, water, and oil pipeline. The report includes basic descriptors of U.S. transportation, such as operating revenues and expenses, number of vehicles and employees, vehicle-miles and passenger miles. The report is a summary of a larger data base, consisting of time-series collected from a variety of government and private statistical handbooks.

by W. F. Gay
Department of Transportation, Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-OST-74-8 ; 1974 ; 157p refs
Rept. for Jan 1962-Dec 1972.
Availability: GPO \$1.80

HS-016 205

ACCIDENTS AND THE ACCIDENT REPEATER

Statistics developed from driver accident data are discussed in terms of the accuracy of various inferences that a small proportion of drivers account for a large proportion of the accidents. Six-year accident records of 7842 California drivers are used as a primary data source. Three fundamental questions are addressed: the fractions of drivers involved in accidents; the effect on the total number of accidents of removing from the road those drivers involved in accidents; and the impact of the so-called high risk driver on the total number of accidents. Various accident statistics are studied and the results obtained from the actual data are compared with those predicted by a model for driver accident involvement that assumes specific variations in accident likelihood among drivers. Examination of the results suggests that, even though substantial differences in accident likelihood do exist among drivers, it is not feasible to reduce drastically the total number of traffic accidents simply by dealing with only a small fraction of drivers.

by J. Ferreira, Jr.
Publ: HS-009 325, DRIVER BEHAVIOR AND ACCIDENT INVOLVEMENT: IMPLICATIONS FOR TORT LIABILITY, Washington, 1970 p9-109
1970 ; 29refs
Dept. of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-009 325

HS-016 206

THE HUMAN FACTOR IN THE HIGHWAY ENVIRONMENT: NORMAL AND DEVIANT BEHAVIOR

Normal and deviant behavior is examined as it relates to highway safety. The tort liability system is discussed briefly, followed by a study of the driver's role in automobile crashes. Causal elements in crash losses are identified as having to do with the road, the roadside, traffic control systems, the vehicle, and the human factor. The interaction of causal factors is described. The limits of driver capability are considered with regard to perception and forecasting, car following (including the shock wave and the freeway ramp), passing, and various implications. It is shown that most drivers commit errors regularly, and that they are deviant only in that they depart from ideal or optimum behavior. Deviant drivers do exist, but they are few in number in comparison with the average drivers who commit most of the errors and become involved in most of the crashes. A certain magnitude of driver error for any driver is

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considered normal. Implications for the negligence law are discussed.

by J. Ferreira, Jr.
HS-009 325, DRIVER BEHAVIOR AND ACCIDENT INVOLVEMENT: IMPLICATIONS FOR TORT LIABILITY, Washington, 1970 p111-98
1970 ; 21refs
Dept. of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-009 325

HS-016 207

DRIVERS WITHOUT INSURANCE

The percentage of private passenger vehicles that are insured for liability for each state is examined. Data were gathered from information concerning numbers of motor vehicles and insurance company statistics. The methodology of obtaining the figures appears to be correct, but three areas are identified which could cause distortion: population movements, definitional differences, and military personnel. It is shown that for the U.S. as a whole, approximately 80% of private passenger vehicles had owners who were insured for liability to compensate accident victims for their damages. The range by state varied between slightly over half the registered vehicles to almost all of them. Only three of the 44 states for which data were available had 90% or more of the private vehicles so insured: Maryland, New York, and North Carolina. Individual state reactions to the findings are reported.

by J. Ferreira, Jr.
Publ: HS-009 325, DRIVER BEHAVIOR AND ACCIDENT INVOLVEMENT: IMPLICATIONS FOR TORT LIABILITY, 1970 p200-13
1970 ; 5refs
Dept. of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-009 325

HS-016 210

THE EVALUATION OF POLICY-RELATED RESEARCH IN EMERGENCY MEDICAL SERVICES: VOL. 1, A SELECTED AND CRITICAL ANNOTATED BIBLIOGRAPHY

The research in emergency medical services is reviewed, and the usefulness of the research for policy-making is systematically evaluated. The decision-makers concerned with emergency medical services policies and operations are identified and supplied with information concerning valid research. Information is supplied concerning gaps in research in emergency medical services, research needs, and useful research methodology. Approaches to the quality of screening of research materials which can be adapted to the needs of various decision makers are presented. The bibliography covers several major subject areas: nature and function, organization and management, and planning and development of emergency medical services; detection and communication; pre-hospital care; ambulance and helicopter transportation services; hospital care; system evaluation; training; information systems; system costs; and public education. The bibliography is one of 19 in a series of projects on the evaluation of policy-

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related research in the field of municipal systems, operation, and services.

by H. Plaas; D. C. Dodson; H. King; D. H. Pike; F. B. Shipley, 2nd.; G. Beal
University of Tennessee, Bureau of Public Administration,
1001 McClung Tower, Knoxville, Tenn. 37916
Grant NSF-GI-39338
1974 ; 471p refs
Vols. 2-4 are HS-016 211--HS-016 213.
Availability: Corporate author

HS-016 211

THE EVALUATION OF POLICY-RELATED RESEARCH IN EMERGENCY MEDICAL SERVICES: VOL. 2, PLANNING, SYSTEM MODELS, AND PERFORMANCE MEASURES (A BIBLIOGRAPHIC REVIEW)

The research in emergency medical services is reviewed, and the usefulness of the research for policy making is systematically evaluated. Details are given on: the concept of planning; the environment of emergency medical services planning; planning activities and tools, and system models such as emergency medical services as a subsystem of the health care system; data based planning, including performance measures, relevant data, role of the event-based models, demand predictive models, ambulance studies, other system models, and event-based models used in planning; and state plans. Various planning guides are reviewed, along with the regional plans of Metropolitan Atlanta, Chicago, Philadelphia, Boston, and Los Angeles. This evaluation is one of 19 in a series of projects on the evaluation of policy-related research in the field of municipal systems, operations, and services.

by H. Plaas; D. C. Dodson; H. King; D. H. Pike; F. B. Shipley, 2nd.; G. Beal
University of Tennessee, Bureau of Public Administration,
1001 McClung Tower, Knoxville, Tenn. 37916
Grant NSF-GI-39338
1974 ; 105p 76refs
Vol. 1 is HS-016 210; vols. 3-4 are HS-016 212--HS-016 213.
Availability: Corporate author

HS-016 212

THE EVALUATION OF POLICY-RELATED RESEARCH IN EMERGENCY MEDICAL SERVICES: VOL. 3, EMERGENCY MEDICAL SERVICES TRANSPORTATION (A BIBLIOGRAPHIC REVIEW)

Medical emergency services (EMS) research is reviewed and its usefulness for policy making is evaluated. Emergency medical transportation systems are described, including the transportation subsystem, system measures, and equipment and standards. Problems associated with EMS transportation systems in both the rural and urban environments are examined. Special consideration is given to operations research in transportation system studies, including: operations research as a tool for analysis; demand for emergency medical services; location studies; dispatching policies; number of ambulances needed. The use of helicopters is also examined, especially in rural areas, with details given on the MAST and AMES Projects, which involved the use of military helicopter evacuation

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and paramedic personnel in four sites in the West and Southwest.

by H. Plaas; D. C. Dodson; H. King; D. H. Pike; F. B. SHIPLEY, 2ND.; G. Beal
University of Tennessee, Bureau of Public Administration,
1001 McClung Tower, Knoxville, Tenn. 37916
Grant NSF-GI-39338
1974 ; 82p 87refs
Vols. 1-2 are HS-016 210--HS-016 211; v 4 is HS-016 213.
Availability: Corporate author

HS-016 213

**THE EVALUATION OF POLICY-RELATED
RESEARCH IN EMERGENCY MEDICAL SERVICES:
VOL. 4, EXECUTIVE SUMMARY**

Emergency medical services research is reviewed and its usefulness for policy making is evaluated. The research team had to: establish the collection, identify the target group (users), screen and select items for validation, prepare and test validation methodology, conduct emergency medical services workshops to review methodologies and findings, and disseminate findings. It was found that there is no area of emergency medical services which has a sufficient research base; there are very few research centers with a continuing interest and capability for the conduct of basic or policy related research in emergency medical services; funding sources and processes discourage the development of quality proposals for research; in-house research conducted by public agencies tends to be of very low quality and with inadequate controls; demonstration projects have not proven fruitful as research mechanisms; a major investment is needed in the development of research methodology and design; a high priority of policy related research should be placed upon studies concerned with the organization and management of emergency medical systems; efforts at system planning and design are generally of poor quality; progress has been made in research related to emergency medical transportation; research on hospital emergency departments is too heavily focused on descriptive studies of patient characteristics and patient utilization; future research must deal with the total system of community health care; existing literature must be screened and evaluated.

by H. Plaas; D. C. J. ...n; H. King; D. H. Pike; F. B. Shiple, 2nd.; G. Be:
Univertisy of Tennessee, Bureau of Public Administration,
1001 McClung Tov , Knoxville, Tenn. 37916
Grant NSF-GI-393
1974 ; 46p
Vols. 1-3 are HS-013 210--HS-016 212.
Availability: Corporate author

HS-016 214

**AUTOMOBILE INSURANCE BREAKTHROUGH IN
CANADA**

The tort system in Canada is described and compared with the American one. Details are offered on how the Canadian system came about, along with the new limited accident benefits plan, the British Columbia plan, the Saskatchewan system, and some other proposals for reform. The plan introduced in seven of the 10 Canadian provinces on January 1, 1969, called a plan of peaceful coexistence, is discussed. The plan will make compensation available on a no-fault basis to many victims of automobile accidents that were precluded

from recovering in the past. The new insurance will be underwritten by the private insurance industry, and no new board is to be established, for the regular court system is left to resolve any disputes that might arise. Compensation for pain and suffering will survive because the tort suit is not affected.

by A. M. Linden
York Univ. Osgoode Hall Law School, Canada
Publ: HS-008 050, COMPARATIVE STUDIES IN
AUTOMOBILE ACCIDENT COMPENSATION,
Washington, 1970 p149-81
1970 ; 11refs
Department of Transportation Automobile Insurance and
Compensation Study.
Availability: In HS-008 050

HS-016 215

**ANALYSIS OF THE SWEDISH AUTO ACCIDENT
COMPENSATION SYSTEM**

The Swedish system of reparation for automobile injuries, which includes social insurance as the means of basic protection, is described. The task of private loss insurance and of tort liability is largely to supplement this basic protection. For automobile injuries, tort liability is more important than for most other kinds of accidents, but the victim will usually have some protection even if he is not entitled to damages in tort. Legal aspects of each type of reparation are surveyed, with consideration given to: national insurance, including medical care, compensation for loss of income, survivors' benefits, financing and effect on damages; industrial injuries insurance; voluntary loss insurance and benefits provided by employers, including accident insurance, sick leave protection; and tort liability, dealing with measure of damages, liability for automobile injuries, compulsory third-party insurance, and the adjustment of claims.

by J. Hellner
University of Stockholm (Sweden)
Publ: HS-008 050, COMPARATIVE STUDIES IN
AUTOMOBILE ACCIDENT COMPENSATION,
Washington, 1970 p115-47
1970
Department of Transportation Automobile Insurance and
Compensation Study.
Availability: In HS-008 050

HS-016 216

**ANALYSIS OF THE BRITISH AUTO ACCIDENT
COMPENSATION SYSTEM**

The actual working of the present rules on liability and insurance coverage, and the present procedures for settlement of claims in Great Britain are reviewed. The basis for legal liability to pay compensation for either personal injuries or property damage in traffic accidents is the tort of negligence, which is based on a concept of fault. Most of the problems arise in relation to evidence and the assessment of damages for personal injuries. The proof of negligence and assessment of damages are examined, along with items justifying a reduction in the assessment of damages, including fault of the plaintiff, taxation, social security benefits, sick pay, pensions, and private insurance. Consideration is also given to assessment of damages in claims following death, property damage in traffic accidents, motor vehicle insurance, direct actions against in-

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urers, uninsured or unidentified defendants, voluntary insurance and family support. The practices and procedures in tort claims are discussed, and various proposals for change are outlined. Comparisons are drawn between the English and American systems.

by D. R. Harris

Balliol Coll., Oxford, England

Publ: HS-008 050, COMPARATIVE STUDIES IN AUTOMOBILE ACCIDENT COMPENSATION, Washington, 1970 p65-113

1970 ; refs

Department of Transportation Automobile Insurance and Compensation Study.

Availability: In HS-008 050

HS-016 217

ANALYSIS OF THE GERMAN AUTO ACCIDENT COMPENSATION SYSTEM

The automobile accident compensation system of the Federal Republic of Germany is described in terms of historical development and specific provisions. The present system of reparation is discussed with regard to: legal bases, conditions of liability, scope of compensation, and procedures involved in determination of liability for motor vehicle accidents; and the legal basis and scope of insurance requirement, enforcement of the insurance coverage, duty to provide coverage, rates, restrictions on cancellation, coverage, and minimum amounts of obligatory liability insurance. A compensation fund for accidents caused by uninsured or unidentified vehicles is described, along with solidarity action in case of insurer insolvencies. Direct compensation is also detailed, such as medical and hospital care, loss of income due to temporary disability, permanent disability, survivors' benefits, and adjustment of pensions. Further consideration is given to recoupment and internal adjustment among insurers, the scope of motor vehicle keepers' liability, the availability of coverage, costs, rate equity, complexity of the system, and reform proposals.

by W. Pfennigstorf

University of Michigan, Ann Arbor

Publ: HS-008 050, COMPARATIVE STUDIES IN AUTOMOBILE ACCIDENT COMPENSATION, Washington, 1970 p33-63

1970 ; 16refs

Department of Transportation Automobile Insurance and Compensation Study.

Availability: In HS-008 050

HS-016 219

DUE PROCESS, EQUAL PROTECTION AND "NO-FAULT" ALLOCATION OF THE COSTS OF AUTOMOBILE ACCIDENTS

The basic causes of the alleged inadequacy of the present system of allocation of costs are described as the fault method of determining eligibility for reparations, and the provision for recovery for pain and suffering without providing an objective standard for measuring this noneconomic form of loss. It is assumed that a serious problem does exist and that no-fault plans may present a practical solution. The possible violation of the due process and equal protection of the Fourteenth Amendment is examined. The constitutional questions arise because the no-fault provisions arbitrarily limit or reduce the existing rights of some and expand the obligations of others. It

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is concluded that the Supreme Court would probably hold that the no-fault plans for the allocation of the costs of automobile accidents do not violate the provisions of the Fourteenth Amendment.

by L. Cowen

University of Georgia

Publ: HS-007 977, CONSTITUTIONAL PROBLEMS IN AUTOMOBILE ACCIDENT COMPENSATION REFORM, Washington, 1970 p1-33

1970 ; refs

Department of Transportation Automobile Insurance and Compensation Study.

Availability: In HS-007 977

HS-016 220

THE VALIDITY UNDER THE CONSTITUTION OF THE UNITED STATES OF BASIC PROTECTION INSURANCE AND SIMILAR PROPOSALS FOR THE REFORM OF THE SYSTEM OF COMPENSATING VICTIMS OF AUTOMOBILE ACCIDENTS

Problems created by the system of compensation for traffic accident victims are described for victims, for the automobile drivers and owners, and for the public. Arguments for reform are reviewed in terms of the inadequacy of the fault concept, difficulties in evaluating damage, state laws to carry liability insurance, insurance costs, and court backlogs. Defenses of the present system of compensation are mentioned. The reform plan advanced by Keeton and O'Connell is shown to have attracted the most attention and controversy. Its provisions are described, along with those of the plan by the American Insurance Association. Contentions that the plan would violate the Fourteenth Amendment are discussed. Special consideration is given to the rights of due process and jury trial.

by J. W. Bishop, Jr.

Yale Univ.

Publ: HS-007 977, CONSTITUTIONAL PROBLEMS IN AUTOMOBILE ACCIDENT COMPENSATION REFORM, Washington, 1970 p35-58

1970 ; refs

Department of Transportation Automobile Insurance and Compensation Study.

Availability: In HS-007 977

HS-016 221

CONSTITUTIONALITY OF AUTOMOBILE ACCIDENT COMPENSATION REFORM BY FEDERAL LAW

The constitutionality of automobile accident compensation reform by federal law is examined. It is shown that the Seventh Amendment is a serious obstacle to federal legislation dispensing with jury trials for determining eligibility for compensation. Either a system of benefits paid out of general funds of the U.S. or a requirement that states adopt approved reform legislation as a condition for grants-in-aid would be secure against judicial invalidation under the doctrines of Frothingham and Massachusetts v. Mellon. It is concluded that federal involvement in financing highway construction makes the federal government responsible for contributing to the

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dimensions of the problem of compensating victims of automobile accidents.

by C. D. Sands
University of Alabama

Publ: HS-007 977, CONSTITUTIONAL PROBLEMS IN AUTOMOBILE ACCIDENT COMPENSATION REFORM, Washington, 1970 p59-94

1970 ; refs

Department of Transportation Automobile Insurance and Compensation Study.

Availability: In HS-007 977

HS-016 222

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE

Conference papers are presented on various aspects of automotive medicine. Topics covered include: hazards of unrestrained occupants; effects of airbag inflation; belted occupant fatalities; infant and child injuries; Injury Severity Score; a proposed injury code; statistical analysis of field accident data; post-crash phenomena; fatalities by postural asphyxia; tarsometatarsal joint injuries; McGill Automotive Collision Investigation Project; case results of 1974 passenger car crashes; SMAC Accident Reconstruction Program; rear-end accident factors; medical-legal problems in determining cause of death; emergency surgical care measurement; emergency medical technician training; vehicle-pedestrian collision experiments with moving dummy; leg injury criteria; telescopic spectacles; motorcycle accidents; development of a national motorcycle training program; snowmobile accidents; drinking drivers and rehabilitation programs; sign brightness effects; predictive value of driver demerit points; U.S. Air Force Multimedia Driver Training Program; psychosocial antecedents of automobile accidents in rural adolescents; criminals who drive; motorcycle operator task analysis research; drinking driving countermeasures; breath measurement instrumentation; and the Abbreviated Injury Scale.

American Assoc. for Automotive Medicine, 801 Green Bay Rd., Lake Bluff, Ill. 60044
1974 ; 510p refs

Includes HS-016 223--HS-016 256. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: Corporate author

HS-016 224

POSSIBLE EFFECTS OF AIRBAG INFLATION ON A STANDING CHILD

The influence of three different inflation pulses on the risk of injury to a standing child was inferentially studied. Pigs weighing 14-15 kg were used as test animals. It is concluded that: an out-of-position passenger of the size of a child 3-6 years of age could be injured by air bag inflation even at the triggering level of vehicle acceleration (12 g); injuries could be due to not only deformations of the body and displacement of internal organs, but also to the air blast effect close to the airbag outlet; injuries could also result from impact on the instrument panel at the same level of acceleration (12 g) if the airbag is prevented from deploying; proper restraining in a rear-facing child seat is apparently safe during collisions comparable to vehicle-barrier impacts at 48.2 km/h (30 mph); and the airbag during its early phase of deployment is so easily influenced in

its deployment direction that it is difficult to obtain reproducible results.

by B. Aldman; A. Andersson; O. Saxmark
Chalmers Univ. of Technology, Dept. of Traffic Safety, Sweden; Volvo A.B., Goteborg, Sweden
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p15-29

1974 ; 6refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 225

INJURIES FATAL TO AUTO OCCUPANTS USING SEAT BELTS

A series of auto driver and passenger fatalities is reported in which each of the deceased was using a voluntary belt restraint system (lap belts or three-point belts) at the moment of the fatal crash. A reconstruction of each lethal episode, based upon vehicle examination, police reports and autopsy data, leads to the following conclusions: with rare exceptions, deaths occurred in spite of and not because of belt use; and two-point lap belts do not consistently prevent fatal injury in high speed crashes. However, a comparison of fatality incidence in belted vs. non-belted victims shows that belt users are not represented in the total crash fatality population to a significant degree.

by L. S. Harris; R. K. Wright
University of Vermont, Coll. of Medicine
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p30-6

1974 ; 3refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 226

THE NEGLECTED CHILD SYNDROME: THE INFANT AND CHILD IN AUTOMOBILE COLLISIONS

A total of 151 automobile collision reports involving over 850 persons were examined; in each case one or more of the passengers was a child under the age of five. Emphasis was placed on post-1966 vehicles, on collisions involving a restrained driver (who would be more likely to be carrying restrained children), and on cases in which the severity of the crash and the severity of the injuries seemed inconsistent. Safety standards for children's car seats were examined and assessed, parental attitudes towards the devices were reported, and current restraints in use in North America evaluated.

by J. S. Moon; J. Nicol
Children's Automobile Safety Res. Com., Consumers' Assoc. of Canada, Toronto, Ont., Canada
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p37-57

1974 ; 1ref

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 227

THE INJURY SEVERITY SCORE: DEVELOPMENT AND POTENTIAL USEFULNESS

A method for comparing death rates of groups of injured persons was developed, using hospital and medical examiner data for more than 2000 persons. The first step was determination of the extent to which injury severity as rated by the Abbreviated Injury Scale correlates with patient survival. Substantial correlation was demonstrated. Controlling for severity of the primary injury made it possible to measure the effect on mortality of additional injuries. Injuries that in themselves would not normally be life-threatening were shown to have a marked effect on mortality when they occurred in combination with other injuries. An Injury Severity Score was developed that correlates well with survival and provides a numerical description of the overall severity of injury for patients with multiple trauma.

by S. P. Baker; B. O'Neill; W. Haddon, Jr.; W. B. Long
 Johns Hopkins Univ. School of Hygiene and Public Health,
 Baltimore, Md.; Insurance Inst. for Hwy. Safety, Washington,
 D.C.; Maryland Inst. for Emergency Medicine, Baltimore, Md.
 Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p58-74

1974 ; 14refs

Supported by the Insurance Inst. for Hwy. Safety, Washington, D.C. and the Maryland Medical-Legal Foundation. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974. Portions previously published in the Journal of Trauma v14 p187-96 (1974).

Availability: In HS-016 222

HS-016 228

A PROPOSED INJURY CODE FOR AUTOMOTIVE ACCIDENT VICTIMS

An injury code designed by the Traffic Records Project of New York State is described which was tested by the state police. The test was done to determine if more precise data could be gathered about the specific injuries sustained by victims of motor vehicle accidents than by using the injury codes of the Manual on Classification of Motor Vehicle Traffic Accidents (D16.1 - 1970). The code described consists of three parts: the location of the most severe physical complaint, the type of physical complaint, and the victim's status. It is concluded that there is need for a more precise code than the current D16.1 levels. A field test of the injury code has yielded accurate results with minimal police training. The coding system clearly differentiates among the most severe types of injuries and can contrast them with lesser injuries. All elements of the proposed code are compatible with the Federal Standard, and can be translated back into that system.

by E. S. Spence
 New York State Dept. of Health
 Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p75-82

1974 ; 1ref

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
 Availability: In HS-016 222

HS-016 229

A STATISTICAL STUDY OF POST-CRASH PHENOMENA IN AUTOMOBILE ACCIDENTS

A one-year study of the incidence rate and consequences of postcrash fuel leakage, fire, submergence, and extrication difficulties was undertaken in Utah. This was a five county study in which local law enforcement agencies assisted to provide data on all automobile accidents in the study area, plus a more detailed followup investigation of a sampling of those accidents which included a postcrash phenomenon of interest. The sample was found to be a good representation of automobile accidents in general. Data were analyzed to provide incidence rates, occurrence mechanisms, and ultimate consequences of the various postcrash phenomena. There were 1049 accidents with 1,267 postcrash incidents involving 1,119 vehicles in the study. Data are presented in tabular form on each postcrash phenomenon. It is concluded that, although one of the subject postcrash events occurs in over 8% of motor vehicle accidents, it is seldom a factor in either injury production or injury aggravation. Because of the low incidence of these postcrash phenomena, it is not clear that the benefits gained by vehicle design improvements would justify the costs involved.

by J. A. Austin; F. R. Wagner

University of Utah, Mechanical Engineering Dept., Salt Lake City, Utah

Contract DOT-HS-047-1-063

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p89-103

1974 ; 12refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
 Availability: In HS-016 222

HS-016 230

AUTO FATALITIES BY POSTURAL ASPHYXIA

Four case reports of motor vehicle death by postural asphyxia are presented. These deaths represent 4% of all motor vehicle occupant deaths during the study period from July 1973 to July 1974 in Vermont. A total of 93 automobile occupant deaths were investigated. Diagnosis criteria were: the absence of lethal traumatic injuries or natural disease processes; the presence of visceral and/or cutaneous petechial hemorrhages not explained by nonasphyxial mechanisms; evidence of a survival interval following each crash; and evidence of a period of time in which the neck was in a posture of flexion. Based on this study, postural asphyxia would seem to be a significant risk in every unconscious crash victim. It appears that ongoing improvements in vehicle and restraint system design may increase the percentage of these fatalities by such mechanisms as holding a crash victim in an upright position. Also, current public education measures, such as failure to correct abnormal neck flexion while awaiting ambulance arrival, leading to significant anoxic injury and even death in the unconscious individual.

by R. K. Wright; L. S. Harris

University of Vermont Coll. of Medicine

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p104-7

1974 ; 5refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
 Availability: In HS-016 222

August 29, 1975

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HS-016 231

TARSO-METATARSAL JOINT INJURIES IN HEAD-ON COLLISIONS

Thirty cases of tarso-metatarsal joint disruptions are presented, all of which occurred in head-on automobile collisions. With two exceptions, all patients were occupants of the front seat. It appears that such an injury may occur when the foot is directed forward into the sloping toe pan or the firewall at time of impact. Although such an injury may have minor status relative to more serious injuries to head, chest, or abdomen, late results of this injury may involve residual disability.

by J. J. Wiley; J. A. Bancroft; J. P. Desjardins
University of Ottawa, Dept. of Orthopaedics, Ottawa, Ont., Canada; Canadian Ministry of Transport, Directorate of Traffic Safety Ottawa, Ont., Canada
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p108-13
1974 ; 3refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 232

MCGILL AUTOMOTIVE COLLISION INVESTIGATION PROJECT

An abbreviated review of the expressway safety portion of the McGill Automotive Collision Investigation Project is presented. An attempt is made to identify the nature and magnitude of local expressway safety problems and to illustrate the need for additional and/or improved vehicle safety standards in Canada. Potential losses on Montreal expressways are categorized. A sample of potential hazards on these expressways is illustrated by accidents involving crossovers resulting from lack of median barriers, and roadside poles or fences inadequately protected or improperly installed. Recommended areas of concern for vehicle improvements to reduce injury severity in accidents are listed. Emphasis is on vehicle and environment factors, since it is felt that realistic improvements can be made in these areas.

by A. L. Thompson; D. Steiner; J. A. Bancroft; R. H. Borkenhagen; A. R. Cook; A. Kanner; E. B. Kennedy; D. Kennedy; R. Kennedy
McGill Univ., Dept. of Mechanical Engineering, Montreal, Que., Canada
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p114-20
1974

Sponsored by the Ministry of Transport, Ottawa, Ont., Canada. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 233

CASE RESULTS OF SOME 1974 PASSENGER CAR CRASHES

With the issuance of the passive restraint standard (FMVSS 208) by NHTSA it was assumed that it would be only a brief period of time (1975 model year) before passive restraints would be standard equipment in passenger cars. As an interim

system, the three-point restraint-starter interlock system was approved. The intent of the system was not only to provide the two outboard front seat occupants with lap/shoulder belt protection, but also to require that these two occupants wear the restraints in order to operate the car. The starter interlock system-equipped cars have been in accidents. In some instances the restraints have been worn and not in others, having been defeated or by-passed. Several 1974 passenger car crash cases are presented to illustrate the effectiveness of the starter-interlock restraint system on injury severity reduction. Case reports and photographs are included.

by H. W. Sherman
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor Mich.
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p121-54
1974 ; 2refs
Sponsored by the Motor Vehicle Mfrs. Assoc. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 234

THE APPLICATION OF THE SMAC ACCIDENT RECONSTRUCTION PROGRAM TO ACTUAL HIGHWAY ACCIDENTS

The Simulation Model of Automobile Collisions (SMAC) computer program was developed to allow highway accidents to be accurately reconstructed by operators without a detailed background of engineering mechanics. A brief summary of how SMAC works is given and actual cases of highway accidents are cited which show how they can be successfully reconstructed. The sensitivity of the final reconstruction to the various program inputs is discussed, giving an indication of how the operator may adjust these inputs to obtain a best fit with the minimum number of iterations. It is concluded that in general the precision with which an accident can be reconstructed will be limited by the accuracy of the available scene data. To overcome this, Calspan is developing an accident reconstruction vehicle, CALVAN, to be used in conjunction with SMAC. This will provide a capability of processing and evaluating accident scene data, using an optical measurement system and mini computer which will then be input to SMAC via a radio link with a remote computer. The reconstructed accident will then be transmitted and displayed visually onboard the van.

by I. S. Jones; D. J. Segal
Calspan Corp., Buffalo, N. Y. 14221
Contract FH-11-7526; DOT-HS-053-1-146
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p155-73
1974 ; 7refs
Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 235

ANALYSIS OF REAR-END ACCIDENT FACTORS AND INJURY PATTERNS

Using a variety of motor vehicle data sources in computer storage at Michigan University's Highway Safety Research Institute, the etiological and medical aspects of rear-end colli-

sions were studied. The data sources indicate that one-fourth of all motor vehicle collisions are of the rear-end type yet account for only 1-4% of the fatalities. Rear-enders occur five times more often in urban than in rural areas and are five time more frequent than head-on collisions. All collisions occur 2.5 times as often in urban areas but rear-end fatalities occur more often in rural areas. In the CPIR file, cars are rear-ended more often by vehicles of larger size than by comparable size or smaller vehicles. Males are more often drivers of the striking car with females being overly represented in the rear-ended vehicle. Drivers of the striking car are more likely to be under 30 years of age and older drivers have a greater chance of being struck. In most rear-end collisions (90%) the occupants of both cars are not injured. Injuries were found more often in the striking car than in the struck vehicle. Although the fuel leakage occurs in rear-end collisions, the greatest number of fires occurs in severe frontal crashes. Neck injury is three to five times more frequent than in any other body region; only 4% of neck injuries were at or above the moderate injury level. Neck injury is more frequent in females than in males. The frequency of neck injury was higher when seat adjuster damage occurred, probably due to higher accident severity. Neck injury frequency does not increase with increased rear-end crush. Neck injuries without fracture dislocation or spinal cord involvement are difficult to assess because of the lack of readily available, quantifiable diagnostic techniques.

by D. F. Huelke; J. C. Marsh

University of Michigan, Ann Arbor, Mich.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p174-99

1974 ; 13refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

MEDICAL-LEGAL PROBLEMS IN DETERMINING CAUSE OF DEATH IN MOTOR VEHICLE ACCIDENTS

The major problems of medical and legal fatality causation in traffic associated deaths are reviewed, and the possible pitfalls in relating causation emphasized. Specific elements discussed include autopsy findings, immediate circumstances of death, explicit or implicit mental intent of the victim, and psychological profile and pattern of the victim. The determination and evaluation of causality is shown to be a very complex process, requiring special skills and thorough understanding of medico-legal issues. Proper determination of medico-legal causality is crucial to the financial and legal interests of many individuals and social groups.

by J. A. Perper; C. H. Wecht

Allegheny Co. Coroner's Office, Pittsburgh, Pa.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p200-7

1974 ; 6refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

MEASURING THE EMERGENCY SURGICAL CARE OF AUTO ACCIDENT PATIENTS

A series of 2389 emergency department surgical admissions were assessed for quantitative indices of actual services rendered and time spent. Auto accident related patients were compared to other Emergency Department surgical patients. The average diagnostic index for auto accident patients was 48 units compared to 25 units for all patients. Their workload for Emergency Department personnel was twice the average for non-automobile accident patients, representing 15% of the total diagnostic services, 12% of the total therapeutic services, and 14% of the total overall services rendered during the period of study. These data confirmed that auto accident related patients are different from the average Emergency Department patients and are quantitatively treated differently from other surgical patients.

by R. E. Burney; M. C. Robson

Yale Univ. School of Medicine, Yale Trauma Prog., New Haven, Conn.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p208-13

1974

Supported by the Commonwealth Fund. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

EMERGENCY MEDICAL TECHNICIAN TRAINING--A SEVEN YEAR WAR

The difficulties and problems New York State faced in the fulfillment of training for an ambulance attendant population of over 31,000 are examined. The development of a program that would raise the level of pre-hospital emergency care on a broad base as an expedient measure followed by a progression of steps to insure effective and efficient emergency care to national acceptable standards is discussed.

by C. F. Mandia

State of New York Dept. of Health, Bureau of Emergency Health Services, Albany, N. Y.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p214-22

1974

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

VEHICLE-PEDESTRIAN COLLISION EXPERIMENTS WITH THE USE OF A MOVING DUMMY

To realize the conditions of real-world accidents, a special test set up was developed to simulate an impact of a moving dummy crossing the road and a moving vehicle. It is concluded that a car friendly to pedestrians should have the following dynamic impact properties: the maximum throw height of the human body should be low; minimum head velocity onto the hood; and the contact time between the pedestrian and the vehicle should be maximum. Including the pedestrian movement additional possibilities of accident reconstruction offer: determination of impact speed and impact point by max-

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imum displacement of pedestrian and also from distance of head dent on the hood to front bumper; determination of walking direction from configuration of head dent and pelvis dent. These investigations enable predictions of the relationship between injuries and environments. Peak accelerations, time histories, and skidding and throwing ahead distances resulting from the test set up are tabulated. Dent configurations are photographed.

by A. Kuhnel
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Berlin, Germany
Publ: HS-016 222, AMERICAN ASSOCIATION FOR
AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE
18TH CONFERENCE, 1974 p223-45
1974 ; 4refs
Sponsored by HUK-Verband, West Germany. Conference
held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 240

A NEW TEST DEVICE FOR PEDESTRIAN-VEHICLE ACCIDENT SIMULATION AND EVALUATION OF LEG INJURY CRITERIA

For the purpose of pedestrian-car accident simulation, a body force measuring test trolley has been developed and described. This permits changing various car front parameters and analyzing their influence on the impact performance. Leg injury criteria, derived from the results of earlier cadaver tests, are discussed allowing the assessment of the pedestrian's primary injuries and their severity through the measurement of reaction forces on the vehicle body. Thus, the dummy test can verify the effectiveness of pedestrian protection systems by predicting injury risk. Both the definition of a tolerance limit and a severity index are given and their advantages and limits are discussed.

by M. Kramer
Institute of Automotive Engineering, Berlin Technical Univ.,
Berlin, Germany
Publ: HS-016 222, AMERICAN ASSOCIATION FOR
AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE
18TH CONFERENCE, 1974 p246-60
1974 ; 6refs
Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 241

TELESCOPIC SPECTACLES AND MOTOR VEHICLE DRIVING LICENSURE

The promotional use of telescopic devices to assist driver licensing candidates in passing static tests of central vision carries many optical limitations. Hazards relate to reduced central field, a ring scotoma, and illusory displacement of images with head movement. Medical advisory boards should

require careful documentation before authorization of such devices.

by A. H. Keeney; S. Weiss; D. Silva
Willis Eye Hosp. and Res. Inst., Philadelphia, Pa.; University
of Louisville, School of Medicine, Louisville, Ky.
Publ: HS-016 222, AMERICAN ASSOCIATION FOR
AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE
18TH CONFERENCE, 1974 p261-4
1974 ; 6refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974
Availability: In HS-016 222

HS-016 242

THE MECHANICS OF MOTORCYCLE ACCIDENTS

Motorcycle accidents in Ottawa during the summer months of 1973 are examined. Among the principle objectives of the study were: investigation in some detail of the actual mechanics of motorcycle collisions, categorization of such collisions in terms of the kinematic behavior of the vehicles and motorcycle occupants, and examination of mitigating circumstances in each accident. Of particular concern has been an examination of accident causative factors and injury producing mechanisms. Some 1:32 scale models were used to reconstruct the accident and were employed in providing a graphic description of the various pre-crash, crash, and post-crash geometries. Sample case reports are included.

by J. A. Newman; G. D. Webster
University of Ottawa, Dept. of Mechanical Engineering,
Ottawa, Ont., Canada
Publ: HS-016 222, AMERICAN ASSOCIATION FOR
AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE
18TH CONFERENCE, 1974 p265-302
1974 ; 17refs
Supported by the Traffic Injury Res. Foundation of Canada,
the Federal Dept. of National Health and Welfare and the
Federal Ministry of Transport. Conference held in Toronto,
Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 243

THE DEVELOPMENT OF A NATIONAL MOTORCYCLE TRAINING PROGRAM

The increases in motorcycle registrations, accidents, injuries, and fatalities in North America over the last 10 years are examined. An attempt is made to determine the underlying causes of these accidents by reviewing available literature. There appears to be general agreement amenable to corrective action. On the basis of cost effectiveness, training and education rate highly as prime countermeasures. The development of the Canadian National Motorcycle Training Program under the auspices of the Canada Safety Council is described, and the methods and techniques are discussed.

by S. Munro
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Safety, Ottawa, Ont., Canada
Publ: HS-016 222, AMERICAN ASSOCIATION FOR
AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE
18TH CONFERENCE, 1974 p303-13
1974 ; 28refs
Sponsored by the Canada Safety Council. Conference held in
Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 244

HSL 75-8

HS-016 244

HIGHLIGHTS OF A TWO YEAR SNOWMOBILE ACCIDENT STUDY IN SASKATCHEWAN

During the winters of 1972/73 and 1973/74, the University of Saskatchewan Vehicle Accident Study Team conducted a study of snowmobile accidents. Findings from 220 accidents are drawn upon and specific cases are used to illustrate typical mechanisms of injury production. Emphasis is placed on the injury producing effect of the driver and machine configuration prior to and during the accident. Where applicable, reference is made to features on the snowmobile which may be associated with the injury. A brief statistical summary of the overall snowmobile injury situation in Central Saskatchewan is provided with reference to driver age, alcohol involvement, accident configuration, injury severity, and lost manhours. Specific injuries attributed to various mechanisms such as vehicle characteristics or occupant position are: fractures of the tibia, fibula, and femur; and knee, foot, spine, collar bone, shoulder, head, face, and external neck injuries. An explanation is offered for the surprising number of accidents occurring as a result of visibility conditions in the Saskatchewan winter of 1973/74.

by M. A. Puckett; A. C. Shiels; D. K. Lischynski
University of Saskatchewan, Transportation Res. Centre,
Saskatoon, Sask., Canada
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p314-30

1974 ; 2refs
Sponsored by the Canadian Ministry of Transport. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 245

DRINKING DRIVERS IN AN ALCOHOLISM PROGRAM

Individuals referred for driving while intoxicated behaved differently from other patients in an alcoholism program. Their attitude as a group was one of lack of cooperation. Few completed the intake procedure, participated in therapy, or availed themselves of therapeutic measures that seemed to help other patients. Many of the individuals referred for driving while intoxicated may be deviant drinkers and may be amenable to interventions different from those provided in voluntary alcoholism programs.

by R. A. Munoz; R. Hoffmann; E. Burg; J. Daane; M. Brown
Department of Psychiatry, Medical Arts Bldg., Sheboygan, Wis.
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE. 1974 p331-9
1974 ; 13refs
Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 246

THE DEVELOPMENT OF EVALUATIVE INSTRUMENTS FOR REHABILITATION PROGRAMS FOR DRUNKEN DRIVERS

Two evaluative instruments useful for Driving While Intoxicated (DWI) programs were developed. The Drinking and Driving Knowledge Inventory was developed using the current literature in the area to formulate the test specification. The Drinking and Driving Opinion Survey, an attitude scale, was developed using equal-appearing-interval scaling. The instruments can measure change in level of DWI information and DWI attitude. The instruments were standardized and the first applied to a DWI rehabilitation course in Phoenix; they are now used routinely in numerous programs throughout the country. Their usefulness as preliminary evaluative measures and as a supplement to follow-up record studies for determining the effectiveness of selected DWI programs has been demonstrated. Practical evaluative designs that can appropriately be applied using the instruments are presented.

by K. J. Simon
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Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p340-59
1974 ; 11refs
Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 247

OPERATIONAL EVALUATION OF COURT PROCEDURES FOR IDENTIFYING PROBLEM-DRINKING DRIVERS

Information was obtained on the operational effectiveness of a questionnaire and interview procedure, previously developed by HSRI, for identifying problem drinkers. Cooperation was obtained from 12 Alcohol Safety Action Projects (ASAP) in which the HSRI procedures were used. In order to obtain information on the statistical effectiveness of the procedures in discriminating between problem drinking drivers and others, among DWI defendants, responses from 709 drivers in three ASAPs were analyzed. Scores on the questionnaire and interview protocol were compared against an objective criterion consisting of blood alcohol level at time of arrest and number of previous DWI and other alcohol offenses. The procedures were found to have good validity and reliability. The analyses indicated that revisions to the previously recommended cut-off scores are needed when used with DWI defendants, to maximize the discriminability between problem and non-problem drinkers. Users of the procedures were surveyed to obtain their judgments of the usefulness of the questionnaire and interviews, and the procedures were generally well received. Based on comments received, some questionnaire items were reworded.

by L. D. Filkins; R. G. Mortimer; D. V. Post; M. M. Chapman
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich.
Contract DOT-HS-031-2-303
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p360-76
1974 ; 9refs
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HS-016 248

AN EVALUATION OF THE EFFECT OF SIGN BRIGHTNESS ON THE SIGN READING BEHAVIOR OF ALCOHOL IMPAIRED DRIVERS

The relationship between highway sign brightness and alcohol impairment under night driving conditions is examined. Sign brightness was controlled by varying the reflectivity of the signs and by employing both low and high headlight beam conditions. The data were collected under controlled conditions at night with the subjects actually driving the vehicle up and down the test track, which was approximately one and a half miles long and had signs mounted at 700 ft. intervals. All signs were mounted on the right shoulder. The dependent measure was the correct reading distance. Three blood alcohol concentrations (BAC's) were investigated: sober, 0.08%, and 0.15%. Fourteen subjects completed the study and each subject participated on three separate nights. Each night was under a different BAC. Some of the subjects experienced difficulty in achieving and/or maintaining the 0.15% BAC. The actual observed overall mean BAC for the 0.15% BAC condition was 0.13%. Results confirmed the experimental hypotheses that high reflectance signs significantly increase sign reading distance under night driving conditions and that alcohol impaired drivers require significantly brighter signs. Increases in both sign reflectance and headlight brightness yielded significant improvements in sign reading performance under all three BAC conditions. A significant interaction between the reflectance and headlight main effects indicated that the higher reflectance signs yielded a greater relative improvement in sign reading performance under low headlight conditions than under high headlight conditions. This is particularly important in view of the fact that previous research has indicated that approximately 70% of nighttime drivers drive with low headlight beams. A significant fatigue effect was noted under both the 0.08% and 0.15% BAC conditions. A significant interaction revealed the synergistic nature of the relationship between the effects of alcohol and fatigue on performance.

by J. A. Hicks, 3rd.

University of South Carolina, Traffic and Transportation Center, Columbia, S. C.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p377-98

1974 ; 16refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

HS-016 249

THE PREDICTIVE VALUE OF DRIVER DEMERIT POINTS IN ONTARIO

In Ontario, demerit points predict future collisions much more strongly than do basic identifying variables, or previous collision. They are found to be the best available means of identifying the high-risk driver. Without exposure data, it is not possible to tell how much of the increased risk of high-point

drivers is due to intrinsically poor driving, and how much is due to increased exposure.

by M. L. Chipman; P. P. Morgan
University of Toronto, Dept. of Preventive Medicine, Toronto, Ont., Canada

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p399-407
1974 ; 7refs

Supported by the Traffic Injury Res. Foundation, Ottawa, Ont., Canada, in cooperation with the Ontario Ministry of Transportation and Communication. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

HS-016 250

THE USAF'S MULTIMEDIA DRIVER TRAINING PROGRAM

In its attempt to decrease the private automobile accidents experienced by U.S. Air Force personnel worldwide, a new driver training program based on the concept of behavior change through attitude change was developed, making use of a multimedia presentation system. A comparison of the USAF accident experience before and after the initiation of this program indicates a marked improvement. The program is currently under revision after being selected by DOT for expansion to civilian use. The rationale, development, results, and projected future expansion of the program are described.

by A. F. Zeller

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Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p408-16
1974

Sponsored by the Dept. of Transportation, Washington, D. C. Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

HS-016 251

PSYCHOSOCIAL ANTECEDENTS OF AUTOMOBILE ACCIDENTS IN RURAL ADOLESCENTS

Teenagers account for a disproportionate number of traffic accidents and violations. Assuming that family disequilibrium affects adolescent driving, the life style and family relationships of 496 adolescents, aged 16 to 19, and their parents were studied in relation to their driving records. Family dysfunction and social stress seem to be very important in the causation of accidents in males, but not females. The only important predictor for females seems to be exposure to risk or actual mileage driven. These preliminary studies give credence to the hypothesis that for males, auto accidents, like social deviancy, are symptomatic of family disorder. That females do not choose the avenue of expression of conflict is probably due to sex role limitations on assertive behavior in girls.

by R. Sobel; R. N. Underhill

Dartmouth Medical School, Hanover, N. H.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p417-31
1974 ; 15refs

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HS-016 252

HS-016 252

CRIMINALS WHO DRIVE

The comparison of driver records of 114 criminals with statistical data on the average Dade County, Florida, driver produced the following results: the criminal driver was 3.25 times as likely to be charged with a traffic violation, was involved in 5.5 times as many property damage and injury producing accidents and 19.5 times as many fatal accidents as the average driver. Further analysis of the data, performed by scaling and categorizing, compared the criminal's degree of involvement in crime and traffic offenses. A significant relationship was noted between categories likely to have been involved in a major crime and those involved in minor traffic offenses in a minor crime. It was suggested that the degree of an individual's deviation from societal norms is similar in divergent areas and that particular sub-groups of individuals are more likely to be involved in serious traffic accidents.

by C. V. Haviland; H. A. B. Wiseman

University of Miami, Dept. of Mechanical Engineering, Coral Gables, Fla.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p432-9

1974 ; 4refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

HS-016 253

MOTORCYCLE OPERATOR TASK ANALYSIS RESEARCH

The development of motorcycle safety education programs is described, including the Beginning Rider Course and the Motorcycle Task Analysis. Steps in defining the key elements of a task are outlined. Technical approaches are employed so that information could be determined which describes the motorcyclist's task in terms of safe operating behaviors, knowledges, and skills. Task criticality is assessed in terms of behavior frequency, error probability, accident likelihood, and accident severity. Objectives for a novice rider course include basic control, safe riding practices, riding techniques under adverse conditions, off-road riding, operator fitness, and motorcycle care. A similar course for advanced riders is outlined. The role of the Motorcycle Safety Foundation is explained.

by C. H. Hartman

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Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p440-4

1974

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Availability: In HS-016 222

HS-016 254

EVALUATION IN THE DRINKING/DRIVING COUNTERMEASURES PROGRAM

Preceding conference papers are examined and are shown in their diversity to all represent efforts to evaluate a series of countermeasures for the driving/drinking problem developed by DOT to combat alcohol related traffic accidents. Comment

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is offered on: the effect of sign brightness on alcohol impaired drivers performance; breath measurement instrumentation; rehabilitation programs; improvement and standardization of traffic and accident records.

by F. A. Seixas

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p445-7

1974 ; 4refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

Availability: In HS-016 222

HS-016 255

BREATH MEASUREMENT INSTRUMENTATION IN THE U. S.

It is shown that the 1970's have been years of accelerated activity in the field of breath measurement and highway safety. At the Federal level, a number of programs have been initiated in this area. Rapid development of new concepts and instrumentation was begun and is continuing. Modifications and additions to the alcohol traffic safety law have reflected technological changes. With the availability of the new breath test laws and the increasingly accurate and effective breath test equipment, the tools to reduce the causal role of alcohol in highway death and injury are ready and should be effectively employed. Comments are made on implied consent and two more recent laws relevant to breath testing: the illegal per se law and the prearrest screening law. States having enacted one or both laws are listed, giving their blood alcohol concentration limits for the per se law. Current DWI arrest procedures are outlined. The six types of breath measurement instrumentation applied to traffic law enforcement are: screening breath testers, evidential breath testers, roadside collection devices, passive breath testers, educational testers, and alcohol safety interlock systems. These are defined and examples of some, including photographs, are given.

by J. V. Moulden; R. B. Voas

National Hwy. Traffic Safety Administration, Washington, D. C.

Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p448-77

1974 ; 4refs

Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.

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HS-016 256

1974 AMA-SAE-AAAM REVISION OF THE ABBREVIATED INJURY SCALE (AIS)

Usage of the Abbreviated Injury Scale (AIS) since 1969 revealed a need to refine the overall AIS rating, to examine mathematical methods for determining the overall injury rating, to eliminate AIS codes based on death, to develop a body region listing and a comprehensive alphabetized listing, and to revise and reclassify a few codings. An ad hoc committee was appointed to perform these tasks. One significant change in the AIS, dropping of the fatal codes, is discussed, along with several minor changes. A definition and discussion of the overall AIS is presented. The Injury Severity Score (ISS) is proposed as a possible means of computing the overall rating, but continued use of the AIS is recommended for the immediate future. A listing of the AIS by body area is included,

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as well as a comprehensive alphabetized listing, developed by the American Medical Association, of injury diagnoses.

by J. D. States; D. F. Huelke; L. N. Hames
Publ: HS-016 222, AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE. PROCEEDINGS OF THE 18TH CONFERENCE, 1974 p479-505
1974 ; 10refs
Conference held in Toronto, Ont., Canada, 12-14 Sep 1974.
Availability: In HS-016 222

HS-016 257

RUMINATIONS ON THE ROLE OF FAULT IN THE HISTORY OF TORTS

In this state-of-the-art study the concept of tort liability as it has evolved through time is reviewed. By the twelfth century the appeal of felony in which the life or limb of the felon was involved developed. From this the stage was set for the appearance of the action of trespass. Included here are liability for fire, liability based upon the harboring of vicious animals, and the liabilities to which common carriers and inn keepers are subject. Beginning in the second half of the eighteenth century there occurred several developments which were to facilitate traffic and transportation substantially in the decades to come and which would invite a readjustment within the law of torts. Despite the almost complete dominance of the idea of strict liability, there has been evident almost from the beginning an intuitive concern by courts for the defendant's blameworthiness or lack of it. Cases in point are used in explanation.

by W. S. Malone
Louisiana State Univ.
Publ: HS-007 978, THE ORIGIN AND DEVELOPMENT OF THE NEGLIGENCE ACTION: STUDIES OF THE ROLE OF FAULT IN AUTOMOBILE ACCIDENT COMPENSATION LAW, 1970 p1-33
1970 ; refs
Department of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-007 978

HS-016 258

ANALYSIS OF THE ORIGIN AND DEVELOPMENT OF THE NEGLIGENCE ACTIONS

The development of tort law is reviewed in historical and legal terms. Details are offered on the origin of the negligence principle and the transition from trespass to negligence, the erosion and decline of negligence during the last half century, and the original and changing purposes of tort law, its present trends and probable future direction. A shift from negligence to strict liability in the automobile field may increase pressure on parties strategically placed to prevent accidents in the following ways: to the extent that liability is put on the maker it is put on the party best circumstanced to avoid defects in manufacture and design; to the extent that motor accidents are caused by employees acting within the scope of their employment (e.g., truck or bus drivers) the employer who bears the brunt of liability is in just as strategic position to control accidents that involve the public as those which involve his employees; to the extent that accidents involve individuals acting on their own, an increasing proportion of them carry liability insurance; and an adequate compensation system which will be more costly to the individual motorist. The additional cost

of compensation might well operate to reduce the amount of driving, and thus the number of accidents.

by F. James
Yale Univ.
Publ: HS-007 978, THE ORIGIN AND DEVELOPMENT OF THE NEGLIGENCE ACTION: STUDIES OF THE ROLE OF FAULT IN AUTOMOBILE ACCIDENT COMPENSATION LAW, 1970 p35-49
1970 ; refs
Department of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-007 978

HS-016 259

NEGLIGENCE AND LIABILITY WITHOUT FAULT IN TORT LAW

A survey of tort law refutes the premise that negligence is the dominant principle of tort law and discloses a surprising number of instances in which liability is imposed without fault. Examples of such instances are given covering a time span from the fourteenth century to date. Conclusion is made that if regard is given to the various types of problems encountered, rather than the number of cases pending on court dockets, strict liability is, more than negligence, the principle applied to determine liability. Prediction is that in the foreseeable future some principle or principles of liability without fault will substantially replace the principles of negligence law in automobile accident claims settlement and litigation.

by C. J. Peck
Washington Univ.
Publ: HS-007 978, THE ORIGIN AND DEVELOPMENT OF THE NEGLIGENCE ACTION: STUDIES OF THE ROLE OF FAULT IN AUTOMOBILE ACCIDENT COMPENSATION LAW, 1970 p51-65
1970 ; refs
Department of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-007 978

HS-016 260

COMPARISON OF STRICT LIABILITY IN PRODUCTS AREA AND AUTO ACCIDENT REPARATIONS

To the extent that products liability without proof of negligence is based on a continuing historical development of an increasingly strict responsibility for breach of warranty or misrepresentation, there is no comparable line of thought applicable in the auto accident field. While there is some evidence that at early common law there was a strict liability for accidental injuries, so long as they were direct, the general tendency of tort law, at least since the middle of the last century, has been to the effect that an actor need not provide any compensation to one he accidentally harms in the absence of negligence or intent. Difficulties as to proof of negligence with regard to both products and automobile accidents liability are discussed, with citations given. The author defends the tort system while making suggestions for the improvement of the negligence system.

by D. W. Noel
Tennessee Univ.
Publ: HS-007 978, THE ORIGIN AND DEVELOPMENT OF THE NEGLIGENCE ACTION: STUDIES OF THE ROLE

HS-016 261

OF FAULT IN AUTOMOBILE ACCIDENT
COMPENSATION LAW, 1970 p67-90

1970 ; 98refs

Department of Transportation Automobile Insurance and Compensation Study.

Availability: In HS-007 978

HS-016 261

ON-BOARD HYDROGEN GENERATOR FOR A PARTIAL HYDROGEN INJECTION INTERNAL COMBUSTION ENGINE

A compact onboard hydrogen generator has been developed for use with a hydrogen enriched gasoline internal combustion engine. The unit uses gasoline and air in a partial oxidation reactor to produce a gaseous product containing hydrogen, carbon monoxide, minor amounts of methane, carbon dioxide and water, and nitrogen. A study of the theoretical equilibrium product composition has indicated an optimum operating point at an air/fuel ratio of 5.15, where a hydrogen/fuel mass ratio of 0.136 can be obtained under soot-free conditions. This is based on a gasoline with an atomic hydrogen to carbon ratio of 1.92. Both thermal and catalytic reactors have been tested. The thermal unit requires a reaction temperature of 2400 deg F to obtain 80% of the theoretical hydrogen yield. Soot formation tends to be a problem. The catalytic reactor yields close to theoretical yields at an operating temperature of 1800 deg F without any soot formation. A commercial nickel catalyst is used. A 100 h test with the catalytic unit showed no signs of performance degradation, using fully leaded Indolene 30. The calculated effect of hydrogen generator operating conditions on the fuel efficiency of a generator/engine combination is presented.

by J. Houseman; D. J. Cerini

California Inst. of Tech., Jet Propulsion Lab.

Contract NAS7-100

Rept. No. SAE-740600 ; 1974 ; 14p 7refs

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974. Sponsored by the National Aeronautics and Space Administration.

Availability: SAE

HS-016 262

DISC BRAKES TAKE ON THE HEAVIES

The history of the Kelsey-Hayes Co. heavy disc brake development program from its inception to the successful application of these brakes for the large front axles of heavy air-braked unit trucks is reviewed. Disc brakes for trucks have been the subject of intensive investigation in the U.S. since their adoption on passenger cars and light trucks in the mid-1960's. Although the basic industry work has covered the full range of medium and heavy hydraulic and air-braked trucks, the first commercial use of heavy-duty calipers will be on the front axles of heavy air-braked trucks where their stability and high torque characteristics are of particular advantage in meeting FMVSS 121, scheduled to become effective March 1, 1975.

by W. T. Birge; K. H. Rinker

Kelsey-Hayes Co.

Rept. No. SAE-740602 ; 1974 ; 16p

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HSL 75-8

HS-016 263

HEAVY TRUCK DISC BRAKES--TESTING FOR TOUGHNESS

Various laboratory tests are outlined which can be utilized to evaluate heavy truck disc brakes. The methods described include supplemental techniques derived from improved dynamometer procedures which assure that the brake components and assembly will perform the intended function and that a practical and effective design has been obtained. They ensure that the brakes will provide the toughness required in the real world environment.

by S. L. Stokes

Wagner Electric Corp.

Rept. No. SAE-740603 ; 1974 ; 6p 1ref

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HS-016 264

DESIGN APPROACHES TO TRUCK DISC BRAKES

Various approaches to truck disc brake design are discussed. Design of the disc and the effect of its design on brake performance show current designs being proposed may be inadequate. Lining area must be adequate for long life without restricting cooling. Piston retraction and adjustment by mechanical means is more reliable than seal retraction. A multiple disc oil-cooled hydraulic disc brake can provide extended life and high torque in a small diameter package. Air-actuated disc brakes eliminate the need for hydraulics, but introduce problems in force multiplication and brake-to-brake balance.

by F. B. Airheart

Hurst/Airheart Products, Inc.

Rept. No. SAE-740604 ; 1974 ; 5p

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HS-016 265

RESEARCH AND DEVELOPMENT OF THE HONDA CVCC ENGINE

Some of the technical considerations are reviewed upon which Honda's CVCC system is based, relating to reduction of pollutants in automobile engine exhaust gases. The CVCC engine employs a stratified charge to produce stable combustion of an overall lean mixture. A unique mixture is formed immediately before ignition to reduce three pollutants (carbon monoxide, hydrocarbons, and nitrogen oxides) simultaneously, as well as to improve fuel economy. This mixture is produced by controlling fuel mixtures supplied to the engine and by geometrical combustion chamber design features. An evaluation model conceived by Honda to evaluate emissions and fuel economy during the driving cycle mode is explained, and a comparison of estimated values obtained from the evaluation model with those obtained under actual driving test conditions is made.

by T. Date; S. Yagi; A. Ishizuya; I. Fujii

Honda Res. and Devel. Co., Ltd.

Rept. No. SAE-740605 ; 1974 ; 19p 5refs

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

August 29, 1975

HS-016 271

HS-016 266

THE TRUCK AUTOMATIC AND VEHICLE ECONOMICS

Because of the increasing complexity of commercial trucking operation and management, the truck automatic transmission is being found to be an asset in terms of overall vehicle economics, in addition to its long recognized features of ease of operation and safety. A number of salient vehicle cost factors upon which the truck automatic transmission has an impact are discussed, along with the transmission design principles which lead to the impact. Acceptance of this premise by the trucking industry is shown by market segment. An indication is also given of forthcoming refinements in transmission design which will further reduce fuel consumption costs.

by J. F. Hittle; A. R. Schuette

General Motors Corp. Detroit Diesel Allison Div.

Rept. No. SAE-740618 ; 1974 ; 12p 3refs

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HS-016 267

WHY NOT TRIPLES? [TRACTOR TRAILERS]

The size and weight of commercial motor vehicles have been effectively frozen since the adoption of the Federal Aid Highway Act of 1956. The removal of political barriers for the liberalization of these restrictions will help stop inflation, while at the same time making potential fuel savings of as much as 21% for intercity freight trucks a reality. With transportation a recurrent cost in every phase of production, distribution, and service, fuel becoming more expensive, and the security of supply more tenuous, the significant increase in transportation efficiency provided by the triple trailer combination must not be withheld from the nation's economy. Millions of operational miles have clearly demonstrated that the nation's highways have been built to the point where they can safely handle this equipment, with triples having established the best safety record of any vehicle ever used on the U.S. highways. Triples also make it possible to move freight with fewer vehicles, reducing highway congestion, conserving energy, and consequently reducing pollution.

by T. D. Hutton

Freightliner Corp.

Rept. No. SAE-740619 ; 1974 ; 16p 23refs

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HS-016 268

NINE WAYS TO GET BETTER FUEL MILEAGE

The widespread problems of gasoline availability which have caused motorists to be concerned with the fuel economy of their cars and with gasoline conservation methods are discussed. As a means of illustrating a variety of effective fuel saving techniques, reference is made to the performance of four cars that have achieved outstanding fuel mileage (150-376 miles/gal) during competition in Shell Mileage Marathon contests. Suggestions are offered for ways in which the average

driver can improve fuel economy in current-type automobiles. The importance of proper vehicle maintenance is also stressed.

by D. L. Berry
Shell Oil Co.

Rept. No. SAE-740620 ; 1974 ; 10p 2refs

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HS-016 269

MACK'S NEW INTERCOOLED SIX CYLINDER DIESEL, MAXIDYNE 300

The application of an advanced state-of-the-art inlet system has produced a high specific output, high torque rise, heavy-duty diesel truck engine. By integrating a compact plate-fin air-to-air heat exchanger with the cooling air driven by a novel tip turbine fan, a 25% increase in power output has been achieved with minimal increase in mechanical engine loads. The use of an aluminum two-piece piston which prevents side thrust loading on the ring-carrying head section results in improved ring life and reduced oil consumption.

by G. W. Robbins; C. K. Salter
Mack Trucks, Inc.

Rept. No. SAE-740622 ; 1974 ; 9p

Presented at the SAE West Coast Meeting, Anaheim, Calif., 12-16 Aug 1974.

Availability: SAE

HS-016 270

WHITE FARM EQUIPMENT'S 4-150 FIELD BOSS

A new, articulated, 4-wheel drive agricultural tractor has been developed which combines the advantages of 2-wheel drive tractors with the advantages of full-time, 4-wheel drive tractors with equal-size wheels. To accomplish this, the tractor incorporates a unique drivetrain and frame arrangement. An unusual cab-mounting arrangement is also used that reduces the chance of serious injury in the event of a rollover.

by M. H. Sickman; G. O. Bowhall
White Farm Equipment Co.

Rept. No. SAE-740645 ; 1974 ; 13p 3refs

Presented at the National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., 9-12 Sep 1974.

Availability: SAE

HS-016 271

OIL-FRICTION MATERIAL INTERACTION AND THE EFFECTS OF CONDITIONS OF USE

Evidence of interaction of oil and friction material on performance characteristics obtained in a wet friction unit is offered from test of five friction materials and five oil types. How the interactions are affected by conditions of use is also explored. Data on variable energy loading, power loading, oil sump temperature, oil flow, and sump volume factors are included, not only as a design guide on methods of eliminating or minimizing performance fluctuations resulting from such interactions, but also to demonstrate the kind of variable that can produce the chemical and/or physical change of sufficient magnitude to modify results. Also demonstrated is the fact

that the effects of such conditions of use are not necessarily consistent and that trends produced by a variable may be different for each oil-friction material system. It is implied that further study of such variables is required to permit scientific selection of the optimum combination for any specific design.

by R. L. Fish
 Raybestos-Manhattan, Inc. Friction Material Div.
 Rept. No. SAE-740655 ; 1974 ; 12p 6refs
 Presented at the National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., 9-12 Sep 1974.
 Availability: SAE

A REVIEW OF FARM TRACTOR TRANSMISSION FLUIDS

New multifunctional farm tractor transmission, hydraulic, and wet brake fluids are being introduced to the tractor industry. The background of tractor lubrication and hydraulic component development that created a need for these fluids is discussed. Fluid friction characteristics tailored to wet brake, power takeoff, and transmission clutch performance along with improved antiwear and extreme pressure protection for gears are taking on more importance with the continued increase in tractor horsepower. At the same time, a long-sought goal of simplifying the number of lubricants required by the tractor industry is being realized through the use of these new fluids.

by L. C. Shrewsbury
 Lubrizol Corp.
 Rept. No. SAE-740656 ; 1974 ; 10p 7refs
 Presented at the National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., 9-12 Sep 1974.
 Availability: SAE

MEETING TRAILER BRAKE REQUIREMENTS OF FRENCH LAW

Inadequate braking systems on large tractor-trailer combinations are shown to be a general problem, and in France they have given rise to a law governing trailer brakes. A description is given of how hydraulically powered braking systems were designed for trailers and tractor-trailers to meet the new requirements. A trailer braking system which is proportional to the tractor brake pedal force and which provides a braking effort between 25-35% (French law) of the trailer maximum gross laden weight, is detailed as the most desirable.

by C. E. Kittle; H. J. Hille
 Deere (John) Waterloo Tractor Works; Deere (John) Works, Mannheim
 Rept. No. SAE-740660 ; 1974 ; 8p 2refs
 Presented at the National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., 9-12 Sep 1974.
 Availability: SAE

BRAKE TEST PROCEDURES AND BRAKE PERFORMANCE CRITERIA FOR AGRICULTURAL EQUIPMENT

The background, contents, and recommended criteria of SAE Recommended Practice J1041, Brake Test Procedures and Brake Performance Criteria for Agricultural Equipment, are discussed. The test procedure and performance criteria are directed toward the safe travel, towing, and parking of agricultural equipment on the highway. The brake test procedures are guidelines for simple enforcement stopping distance or certification requirements, if needed. The performance criteria are based on safety study reports, technological information, and current regulations in European countries. This Recommended Practice is the result of the first step in the development of an agricultural brake standard. It must be tried, critiqued, and reviewed by all that it may serve or influence, and may, when proven, develop into a recognized voluntary standard whose acceptance and usage will achieve an improvement on safety on the highway and in agriculture.

by J. E. Langdon
 Case (J. I.) Co.
 Rept. No. SAE-740661 ; 1974 ; 5p 8refs
 Presented at the National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., 9-12 Sep 1974.
 Availability: SAE

RATIONALIZATION OF LUBRICANTS FOR AGRICULTURAL TRACTORS

The sequential development of both multipurpose and universal oils for agricultural tractors is described. Universal oil infers the concept of one oil to lubricate the tractor including engine, drivelines, oil-immersed brakes, if fitted, and farm equipment, whereas a multipurpose oil lubricates drivelines, brakes, and equipment but not the engine. Such rationalization is desirable both to the user and to the oil supplier, and it has proved technically feasible to meet the requirements of most major manufacturers' tractors in service. Successful rationalization depends upon careful selection of additives and comprehensive testing in rigs and tractors. Multipurpose formulations must have specific characteristics for lubricating both immersed disc brakes and immersed power takeoff clutches and load-carrying and antiwear properties for gearing, pumps, bearings, etc. Equally important are oxidation-corrosion stability, seal performance, rheology, and other related chemical and physical properties. The universal oil must provide for all the preceding driveline requirements and in addition lubricate the engine. The problems arising from such developments and the ways in which the difficulties have been overcome are explained.

by I. Keddie; W. A. Munday; E. L. Padmore
 Shell Res. Ltd. Thornton Res. Centre
 Rept. No. SAE-740667 ; 1974 ; 15p 1ref
 Presented at the National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., 9-12 Sep 1974.
 Availability: SAE

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HS-016 276

AIR BAG DEVELOPMENT AND TECHNOLOGY. HEARING

Congressional hearings are presented which review the status of air bag technology and development. Witnesses include persons primarily involved in determining government and industry policy on air bags, along with those who are the beneficiaries of air bag technology, the "non-victims" of air-bag-equipped vehicles involved in actual accidents. A dummy standard which was promulgated by the Department of Transportation and which would allow manufacturers to produce an optional air bag system is discussed, with factors which were considered in refining the parameters of the dummy defined in that standard. Testimony is offered by representatives of major automobile industries and the National Highway Traffic Safety Administration on proposed plans for development and testing of both air bags and dummies. Photographs and tabular data are included.

Congress. Senate. Committee on Commerce
1973 ; 174p
93rd Congress, 1st Sess., Serial 93-43, 1 Aug 1973.
Availability: GPO

HS-016 277

REVIEW OF SAFETY BELT USAGE AND EFFECTIVENESS IN ACCIDENTS

Current information on the use rates and injury-reducing potential of safety belts is reviewed, with emphasis on overall effectiveness so that various comparisons that are made between safety belts and other occupant protection measures such as air bags will be valid and relevant. It is noted that precise information on safety belt usage and effectiveness is not available, but that the data make it clear that wearing belts does substantially reduce the likelihood of serious injury to occupants of vehicles in crashes. Critical review of the literature and the computations with the CALSPAN level II accident investigation file and the multidisciplinary accident investigation (MDAI) file (CPIR3) have led to the following recommended figures for safety belt effectiveness as measured by reduction in the chance of injury when lap belts are worn: any injury, 15-25%; serious or fatal injury, 22-38%; fatal injury, 30-50%. It is concluded that the lap-shoulder belt combination restraint system provides more protection than lap belt only. An attachment is included to the report showing the benefits of lap belts in reducing serious injury and death, in front-end collisions, in non-ejection accidents, in injury prevention, and in causing injury; and shoulder belt studies, including foreign research such as the studies in Sweden and Australia.

by D. F. Mela
National Hwy. Traf. Safety Administration, Office of
Statistics and Analysis
1974 ; 34p 6refs
Availability: Corporate author

HS-016 278

DYNASIM 3: A COMPUTER PROGRAM FOR SIMULATION OF VEHICLE RIDING MOTIONS

Analytical techniques are presented for evaluating the dynamic riding behavior of a vehicle. These techniques have been ap-

plied to a fairly sophisticated model of a bus, where a three-dimensional structure, elastic frame and non-linear shock absorbers have been considered. A computer simulation program (DYNASIM 3) has been set up which is actually used at Fiat Corporation for evaluating vehicle riding qualities and improving the design process.

by F. Donati; R. Genesio; A. Laurentini; V. Mauro; G. Menga; M. Milanese
Publ: VEHICLE SYSTEM DYNAMICS v3 n3 p141-61 (Nov 1974)
1974 ; 7refs
Availability: See publication

HS-016 279

ON THE INFLUENCE OF WEIGHT REDUCTION AND WEIGHT DISTRIBUTION ON VEHICLE HANDLING, RIDE AND PERFORMANCE

The dynamic characteristics of a full sized passenger automobile of the 5000-6000 lb weight class are discussed relative to vehicle handling, performance and ride quality. Weight and moment of inertia parameters are introduced to modify weights and mass moment of inertia judiciously, and the dynamic behavior is investigated on the basis of the above criteria. Finally, weight reductions at discrete locations along the vehicle length axis are contemplated and the dynamic behavior is determined relative to the above criteria. The overall geometry of the vehicle is considered as being fixed for all weight modifications.

by H. K. Sachs
Publ: VEHICLE SYSTEM DYNAMICS v3 n3 p163-91 (Nov 1974)
1974 ; 7refs
Sponsored by the U. S. Dept. of Transportation,
Transportation Systems Center, Cambridge, Mass.
Availability: See publication

HS-016 280

MOTOR VEHICLE STATISTICS OF JAPAN 1974

Japanese motor vehicle statistics are presented, covering motor vehicles in use, new registrations, production, domestic sales, exports, and imports. The data generally cover the years 1951 through 1973. Separate figures are reported for motorcycles and motor scooters, apart from cars, trucks, buses, and three-wheelers.

Japan Automobile Mfrs. Assoc., Inc., 30 East 42nd St., New York, N. Y. 10017
1974 ; 27p
Availability: Corporate author

HS-016 281

A TECHNIQUE FOR EVALUATING THE HYSTERESIS PROPERTIES OF TIRE CORDS

A slow speed cyclic test has been developed to evaluate tire cord hysteresis properties. Programmed stress variations on an Instron were used to simulate the magnitude and sequence of cord stresses in a running step-loaded tire, and relationships were formulated to approximate the dependence of cord heat generation on tire loads, air pressures, and temperatures. The

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test assumes that tire air pressure imposes a peak stress on cords and that increasing loads on a running tire cause increasing intermittent cord stress relief. Nearly linear relationships result between the log of work loss and the extent of stress relief, which affords a means of comparing cord hysteresis properties over a range of simulated tire loads. The validity of the slow speed results was verified at laboratory test speeds comparable to those encountered in normal tire use. Results generally agreed with long standing qualitative observations of tire cord performance. Commercial polyester and nylon greige cords were used for test development and other cord materials, both greige and dipped, have been evaluated. A range of hysteresis properties was obtained on variations in polyester cords.

by E. J. Powers

Publ: RUBBER CHEMISTRY AND TECHNOLOGY v47 n5 p1053-65 (Dec 1974)

1974 ; 17refs

Presented at a joint meeting of the Rubber Div., American Chemical Society and the Macromolecular Science Div. of the Chemical Inst. of Canada, Toronto, Ont., Canada, 7-10 May 1974.

Availability: See publication

HS-801 400

COMMUNICATIONS STRATEGIES ON ALCOHOL AND HIGHWAY SAFETY. VOL. 1. ADULTS 18-55. FINAL REPORT

Target populations and communication strategies are identified for encouraging personal action steps to prevent drunk driving. Fully 54% of adult Americans participate at least once a month in social or business situations where alcohol is served; they are termed ARS-Involved. This group has the potential for controlling drinking or restraining drunk drivers. The types of measures they are willing to take are restricted to friends and relatives, and include offer to drive, invite to stay over, call a taxi, and serve food with liquor to reduce intoxication. Adults seem less able to recognize impairment in others, but are quite willing to act. They have several misperceptions about causes and solutions of impairment. More than 60% mistakenly believe that a can of beer or a drink of wine is less intoxicating than an average drink of liquor. Findings are recommended which are based on a national probability sample of 1600 adults. Target populations for advertising are differentiated on the basis of life styles and personality profiles.

Grey Advertising, Inc., Res. Dept., 777 3rd Ave., New York, N. Y. 10017

Contract DOT-HS-074-1-096

1975 ; 222p 21refs

Rept. for Feb-Dec 1974. Vol. 2 is HS-801 401.

Availability: NTIS

HS-801 401

COMMUNICATIONS STRATEGIES ON ALCOHOL AND HIGHWAY SAFETY. VOL. 2. HIGH SCHOOL YOUTH. FINAL REPORT

Target populations and communications strategies are identified for encouraging personal action steps to prevent drunk driving. One fourth of high schoolers in a representative sample taken from 25 locations in the U.S. said they had driven once or twice when they knew they were too drunk to drive. Some 32% said they rode in cars driven by a heavily

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drinking driver at least once a month. The youth believe their driving skills are relatively unimpaired by alcohol and that serious consequences don't exist for teen drunk drivers. Half of the high school youth are drinking frequently and are unaware of the serious consequences of impaired driving. More than 74% believe a can of beer or a drink of wine is less intoxicating than an average drink of liquor. Some 70% of those involved with alcohol believe it is the parents' responsibility to explain the use of alcoholic beverages. Education programs should be aimed at correcting current misconceptions about drinking and driving and should depict personal action to prevent drunk driving as acceptable, expected behavior in the peer group.

Grey Advertising, Inc., Res. Dept., 777 3rd Ave., New York, N. Y. 10017

Contract DOT-HS-074-1-096

1975 ; 119p 21refs

Rept. for Feb-Dec 1974. Vol. 1 is HS-801 400.

Availability: NTIS

HS-801 405

MATHEMATICAL RECONSTRUCTION OF HIGHWAY ACCIDENTS--SCENE MEASUREMENT AND DATA PROCESSING SYSTEM. FINAL REPORT (PT. 2)

A computer program and an associated optical measurement system have been developed to aid the investigation of highway accidents. They provide a capability of processing and evaluating scene data, via radio contact with a remote computer, while the investigators are at the accident scene. Results of the third year of effort are presented and discussed, including the results of field testing by a local police agency. It is concluded that development of the prototype system has reached a point where it can be routinely applied to many highway accidents. Proposed modifications and extensions, aimed at greater ease of application and at increased generality, are presented and discussed.

by R. R. McHenry; I. S. Jones; J. P. Lynch
Calspan Corp., 4455 Genesee St., Buffalo, N. Y. 14221

Contract DOT-HS-053-3-658

Rept. No. ZQ-5341-V-2 ; 1975 ; 171p 19refs

Rept. for Jun 1973-Dec 1974. See also HS-801 150.

Availability: NTIS

HS-801 406

AUTOMOBILE CONTROLLABILITY--DRIVER/VEHICLE RESPONSE FOR STEERING CONTROL. VOL. 2--SUPPORTING EXPERIMENTAL RESULTS. FINAL REPORT

The experimental results that support the discussion and conclusions of driver/vehicle response research regarding automobile controllability are presented. Fixed-base simulation results of driver/vehicle system dynamics for lateral regulation are given. Results of full scale tests to determine driver/vehicle system dynamics for a broad spectrum of vehicle dynamics and steering maneuvers are detailed with regard to vehicle dynamic configurations, test procedures, and test driver/vehicle regulation task results. Results of validation experiments are included. Appendices provide descriptions of: the laboratory vehicles, instrumentation, and test procedures; steering characteristics of test vehicle configuration and

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production vehicles; the maneuver complex; and driver subjects used in the validation test series.

by R. H. Klein; D. T. McRuer; D. H. Weir; R. W. Allen; R. W. Humes; J. W. Zellner
Systems Technology, Inc., 13766 S. Hawthorne Blvd.,
Hawthorne, Calif. 90250
Contract DOT-HS-359-3-762
Rept. No. TR-1040-1-2 ; 1975 ; 304p
Rept. for Jun 1974-Oct 1975. Vol. 1 is HS-801 407.
Availability: NTIS

HS-801 408

NHTSA REGIONAL MANAGEMENT INFORMATION SYSTEM. FINAL REPORT

The constant problem being faced by decision makers at the regional level when attempting to sort through the maze of available data to find the information desired is examined. Initial steps in the study included discussions with state and regional decision makers to determine types of information needed and an inventory of data sources to determine what was available. It was found that virtually all information required was already potentially available from existing data sources. The study presented an approach of streamlining information flow between offices on a functional basis rather than along the more traditional organizational lines. Included in the system is a feature of feedback reports to show that uses were made of the information. The system approach is designed to be dynamic in nature to add or eliminate exchange of information consistent with management needs.

Safety Management Inst., 1600 L St., N. W., Washington, D. C. 20036
Contract DOT-HS-021-3-563
1975 ; 142p
Rept. for Nov 1972-Jun 1974.
Availability: NTIS

HS-801 411

DRUG USE AMONG DRIVERS. FINAL REPORT

Randomly selected drivers were stopped at times and places of previous fatal crashes in Lincoln, Nebraska, and Dade County (Miami), Florida. Breath, urine, blood, and lip swab samples were requested for later analysis for drugs and medications. A cooperation rate of % was achieved for most aspects of the survey, and slightly less for obtaining a blood sample. Overall, 1029 urine samples and 840 blood samples were collected and analyzed. About 3% of the Lincoln drivers and 2% of the Dade County drivers evidenced one or more of the 41 drugs tested in the blood or at concentrations of 1 mg/ml or more in the urine. At least a trace amount was confirmed in about 4.3% of each driver group. Sedatives, particularly phenobarbital, were the most commonly found drugs. In addition to the 41 drugs, marijuana traces were found on the lip swabs of 3% of the Lincoln drivers and 9% of the Dade County drivers. The living driver findings were compared with similar results from fatally injured drivers obtained under a previous contract. The comparison indicates that users of drugs are about

four times as likely to be fatally injured in a vehicular crash as nonusers.

by W. D. Glauz; R. R. Blackburn
Midwest Res. Inst., 425 Volker Blvd., Kansas City, Mo. 64110
Contract DOT-HS-119-2-440; Ref: DOT-HS-119-3-627
Rept. No. 3668-E ; 1975 ; 115p 4refs
Rept. for Jun 1972-Aug 1974.
Availability: NTIS

HS-801 412

IMPROVING HIGHWAY SAFETY MANPOWER: COMMERCIAL DRIVING SCHOOL INSTRUCTOR PROJECT AT ESSEX COUNTY COLLEGE. FINAL REPORT (PHASE 1)

An associated degree curriculum to train commercial driving school instructors was developed and tested. The test site was Essex County College (New Jersey). Curriculum was heavily influenced by materials developed by the National Highway Traffic Safety Administration, based on research conducted by the Human Resources Research Organization. Findings, conclusions, and recommendations based on the testing efforts are given. The primary conclusion is that the NHTSA materials were an adequate base for the development of an associate degree curriculum to train instructors for commercial driver training schools. There is a need to upgrade state requirements and professional rewards for commercial driving school instructors to provide incentive for investment in training experiences. The primary recommendation is that the experiences of the participating college should be utilized as a frame of reference by other community and junior colleges in developing and offering associate degree and certificate programs to train commercial driving school instructors. Appendices contain an instructor's guide to each technical course developed for the curriculum by Essex County College.

by A. S. Korim
American Assoc. of Community and Junior Colleges, 1 Dupont Circle, N. W., Suite 410, Washington, D. C. 20036
Contract DOT-HS-207-2-337
1975 ; 54p 19refs
Rept. for 1 Apr 1972-30 Jun 1974. Subcontracted to Essex County Coll., N. J.
Availability: NTIS

HS-801 413

A REVIEW OF THE LITERATURE ON THE INVOLVEMENT OF ALCOHOL IN PEDESTRIAN COLLISIONS RESULTING IN DEATH AND INJURY. INTERIM REPORT

The literature and existing state of knowledge regarding alcohol and pedestrian safety is summarized. Attention is focused on the frequency and possible overinvolvement of alcohol in pedestrian accidents and alcohol as a causative element in these accidents. The nature of existing data on alcohol and pedestrian safety is examined with regard to: fatality data, including distribution by blood alcohol concentration; controlled studies of fatal crashes; and behavioral responsibility, whether alcohol-impaired or sober. Estimating the role of alcohol in fatal pedestrian accidents is covered in terms of numbers of alcohol related fatalities, child and adult pedestrians, inferences from non-alcohol-related data, and the ratio of pedestrian deaths to pedestrian injuries. Crash dynamics, fatal

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and non-fatal, are examined in relation to: accident types; primary precipitating factors; pedestrian age, sex, race, and injury severity; and time of day and day of week. The implications of the findings are discussed. It is concluded that little is currently known of this problem and more data are needed before the extent of any pedestrian safety problems involving alcohol can be quantified or countermeasures can be devised.

by R. Zylman; R. D. Blomberg; D. F. Preusser
Dunlap and Associates, Inc., 1 Parkland Dr., Darien, Conn.
06820
Contract DOT-HS-4-00946
Rept. No. ED-74-10 ; 1975 ; 58p 98refs
Rept. for Jun 1974-Sep 1974.
Availability: NTIS

HS-801 415

FEASIBILITY STUDY--NATIONAL CENTER FOR STATISTICAL ANALYSIS OF HIGHWAY OPERATIONS. HIGHWAY SAFETY ACT OF 1973 (SECTION 213). VOL. 1, EXECUTIVE SUMMARY

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1975 ; 24p

A report to Congress from the Secretary of Transportation.
For abstract, see HS-801 416.

Availability: NHTSA

HS-801 416

FEASIBILITY STUDY--NATIONAL CENTER FOR STATISTICAL ANALYSIS OF HIGHWAY OPERATIONS. HIGHWAY SAFETY ACT OF 1973 (SECTION 213). VOL. 2, TECHNICAL REPORT

The requirement for improved data bases and analyses has been identified as the most pressing need in the nation's highway safety program. The development of an improved data system should carry the highest priority among the various national highway safety program alternative. It is feasible to establish a National Center which would be responsible for the development of an improved highway safety data system. It is recommended that the current NHTSA efforts to enhance its data base should receive greater emphasis. Legislative establishment of a National Center should be deferred pending the results of such action. Details are offered on: objectives of a national Center; existing related data base systems and development efforts; functions, data programs, and computer system requirements of the National Center; other similar national statistical data centers; design of the National Center; center implementation and general feasibility of a data center. Appendices comment on various data bases within NHTSA and in other agencies, as well as technical requirements for the proposed center.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1975 ; 297p 18refs
A report to Congress from the Secretary of Transportation.
For Executive Summary, see HS-801 415.
Availability: NHTSA

HSL 75-8

HS-801 419

UNIFORM TIRE QUALITY GRADING. TREADWEAR. VOL. 1. FINAL REPORT

The Uniform Tire Quality Grading proposes a procedure whereby NHTSA specified control tire is used to determine the suitability of the test route. A route that would yield the desired wear rate for the control tires was established and verified. It was also verified that slight changes in wear rate could be obtained by changing the cornering speed on specific parts of the route, and that the control tire was responsive to both slight and major changes in the route. The control tire used (General SAE Traction Tire, 7.75-14 bias construction) showed good reproducability as to wear data. All four tires used in the route determination showed wear rates within a 1% spread. The four tires used as controls for the 16,000 mile test showed wear rates within a 5% spread. The two D78-14 sets of tires tested showed that the average wear rate for the set that operated at 24 psi (cold) inflation with a test load of 1008 lbs was 63.1%. The set that operated at 32 psi (cold) inflation with a test load of 1188 lbs was 55.7% worn. When both were rated using the Treadwear Rating Calculation method the 32 psi tires rated 120.6, while the 24 psi tires rated 106.9. This represents a percentage change of 11.4%. Because of the sample size, definite conclusions could be erroneous; but the difference would seem to be significant enough to conclude that the higher the inflation pressure, the higher the Treadwear Rating for the same type of tire.

by J. E. Shearer
Compliance Testing, Inc., 1150 N. Freedom St., Ravenna,
Ohio 44266
Contract DOT-HS-4-00811
1975 ; 98p
Rept. for Jul-Sep 1974. See also HS-801 336 (draft copy of v1-
2 of this title).
Availability: NTIS

HS-801 420

AN ACCIDENT TREND MODEL. FINAL REPORT

The motor vehicle death trend has some characteristics which should be explained by any satisfactory model: sudden changes in the long-term trend in 1951 and 1966; and dips in the recession years 1953, 1958, and 1970. The following factors influencing the trend could be quantitatively modeled: safety features in passenger cars; and changes in the weight mix of the passenger car population. The impact of other factors could not be realistically quantified under the current state of knowledge. Applying the models for the quantifiable factors to the number of passenger car occupant deaths, adjusted death numbers were obtained. Since they could be explained no further, a descriptive or formal model was sought. The only model consistently fitting the data of a base period for which it was developed, and giving good projections beyond the base period, used the number of passenger cars registered by age as independent variables. Using three age groups--current model year, one through three years old, and four year or older--a linear model was found sufficient. The formal model was used to project the number of adjusted automobile occupant deaths to 1985, on the basis of registration projections resulting in 117 million passenger cars in 1980, and 135 million cars in 1985. A high projection was obtained using data from a recent time

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period, and a low projection was obtained using data from an earlier time period. Results are shown graphically.

by H. C. Joksch
Center for the Environment and Man, Inc., 275 Windsor St.,
Hartford, Conn. 06120
Contract DOT-HS-246-3-670
Rept. No. CEM-4148-510 ; 1975 ; 164p 44refs
Rept. for May 1973-Aug 1974.
Availability: NTIS

HS-801 431

**PERFORMANCE EVALUATION OF NEW
GENERATION 50TH PERCENTILE
ANTHROPOMORPHIC TEST DEVICES. VOL. 1.
TECHNICAL REPORT. FINAL REPORT**

Two new generation anthropomorphic test dummies, GM-50X, were experimentally evaluated to determine the degree of conformance to the specifications contained in the purchase description of the NHTSA 50th Percentile Anthropomorphic Test Dummy, and to establish by sled testing in typical restraint and crash environments their potential for experimental repeatability. A series of 11 static and dynamic component tests were performed to measure the GM-50X dummies in accordance with the purchase description; the results indicate substantial non-conformance with the specified criteria. Four 30 mph sled test configurations were used to determine the experimental repeatability: Type 2 belt, air bag, energy absorbing steering column, and simulated instrument panel with Type 1 belt. The findings of a statistical study of repeatability of experimental results is presented in which the GM-50X dummy is compared to the HSRI dummy and to the Hybrid 2 dummy. The study also includes a statistical comparison of the results of comparable sled tests performed on the HSRI dummy. A simulation study of the response sensitivity of anthropomorphic test devices to parameter variation is also presented.

by D. E. Massing; K. N. Naab; P. E. Yates
Calspan Corp., P. O. Box 235, Buffalo, N. Y. 14221
Contract DOT-S-053-3-664
Rept. No. ZS-5352-V-2 ; 1975 ; 240p 6refs
Rept. for Jun 1973-Aug 1974. Vol 2 is HS-801 432.
Availability: NTIS

HS-801 432

**PERFORMANCE EVALUATION OF NEW
GENERATION 50TH PERCENTILE
ANTHROPOMORPHIC TEST DEVICES. VOL. 2.
ACCELERATOR SLED TEST DATA. FINAL REPORT**

Four sled test configurations were used to evaluate the dynamic performance repeatability of the GM-50X dummy. Type 2 belt, pre-inflated air bag, energy absorbing steering column, and Type 1 belt with simulated instrument panel test environment were utilized to measure the performance of two identically fabricated dummies. The graphical results of a statistical analysis performed on the results obtained from the Type 2 belt and air bag configuration tests of the GM-50X dummies is presented. Graphical results of the energy absorbing steering column and simulated panel tests of the GM-50X dummies are provided in raw form. The graphical results of a statistical analysis performed on HSRI dummy S/N 2 sled test results

obtained from the FAA-Civil Aeromedical Institute are also given.

by D. E. Massing; K. N. Naab; P. E. Yates
Calspan Corp., P. O. Box 235, Buffalo, N. Y. 14221
Contract DOT-HS-053-3-664
Rept. No. ZS-5352-V-3 ; 1975 ; 560p 1ref
Rept. for Jun 1973 - Aug 1974. Vol. 1 is HS-801 431.
Availability: NTIS

HS-801 450

**THREAT DETECTION TRAINING PROGRAMS FOR
CHILD PEDESTRIAN SAFETY. VOL. 1. CONDUCT,
RESULTS, AND RECOMMENDATIONS. FINAL
REPORT**

The research aim was to identify efficient, safe, street-crossing behavior sequence for children, and to develop and pilot test programs to train the sequence in urban public schools for kindergarten to third graders. Phase 1 work included behavioral analysis to find optimum street-crossing behavior sequence, evaluate behavior-modification techniques, investigate constraints (cost, school resource limitations, school personnel training and attitudes). Phase 2 developed three programs evaluated for adequacy, feasibility, and cost by project staff, consultants, six school principals, and 11 teachers. In the Basic Program, the teacher introduces the program and behavior sequence; children practice the sequence through games played on a lo-fi simulated classroom street and later on real streets, with traffic blocked. In the Film Program, the behavior sequence is introduced via a film starring Captain Kangaroo. In the Simulator Program, children practice the sequence in hi-fi classroom simulator, using two rear-projected synchronized color films of moving traffic. Phase 3 pilot-tested the training programs in three urban Pittsburgh schools for effectiveness, permanency, and training materials adequacy, using one pretest and two posttests. All three programs considerably reduced unsafe street crossing behavior. Film and Simulator programs were generally superior to the Basic.

by R. L. Dueker
Applied Science Associates, Inc., P. O. Box 158, Valencia, Pa.
16059
Contract DOT-HS-339-3-726
1975 ; 73p
Rept. for 22 Jun 1973-30 Jun 1974. Vol. 2 is HS-801 451.
Availability: NTIS \$3.00

HS-801 451

**THREAT DETECTION TRAINING PROGRAMS FOR
CHILD PEDESTRIAN SAFETY. VOL. 2. PROGRAM
TRAINING MATERIALS. FINAL REPORT**

Detailed descriptions are presented of the major training program materials for a three-phase program to identify efficient, safe street-crossing behavior sequence for children, and to develop and pilot test programs to train the sequence in urban schools in kindergarten through third grade. Detailed coverage of training program content is also provided via the text of the Teacher's Guide. The materials, as presented, have been

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modified in accordance with the recommendations resulting from the pilot testing.

by R. L. Dueker
Applied Science Associates, Inc., P. O. Box 158, Valencia, Pa.
16059
Contract DOT-HS-339-3-726
1975 ; 80p 1ref
Rept. for 22 Jun 1973-30 Jun 1974. Vol. 1 is HS-801 450.
Availability: NTIS \$3.00

HS-801 453

**ANALYSIS OF PROBLEMS IN THE APPLICATION
OF RADAR SENSORS TO AUTOMOTIVE
COLLISION PREVENTION (EXECUTIVE
SUMMARY). FINAL REPORT**

by R. A. Chandler; L. E. Wood; L. A. Jacobson
Deptment of Commerce, Inst. for Telecommunication
Sciences, Boulder, Colo. 80302
Contract DOT-HS-4-00813
1975 ; 27p 2refs
Rept. for Jan 1974-Jan 1975. For abstract, see HS-801 452.
Availability: NTIS

HS-801 455

**STUDY OF SEAT BELT USAGE: 1973 AND 1974
VEHICLES IN THE STATE OF UTAH. FINAL
REPORT**

Seat belt usage in 1973 versus 1974 vehicles involved in accidents in Utah is examined in a special studies effort as part of the Utah Multidisciplinary Accident Investigation Research. The representativeness of the state with regard to national statistics is assessed. The seat belt comparisons are made by age of driver, type of vehicle, residences of driver, and injury level. Statistics are also presented on front right and rear seat belt usage. The study also involved a telephone survey to 1974 vehicle drivers involved in accidents to ascertain the effectiveness of the ignition interlock system. Reasons and methods of by-passing the interlock are listed.

by J. A. Austin; R. Limpert
Utah Univ., Multidisciplinary Accident Investigation Team,
Salt Lake City, Utah 84112
Contract DOT-HS-4-00810
Rept. No. UTEC-ME-74-147 ; 1975 ; 49p
Rept. for 16 Nov 1973-30 Nov 1974.
Availability: NTIS

HS-801 457

**IDENTIFICATION AND TEST OF PEDESTRIAN
SAFETY MESSAGES FOR PUBLIC EDUCATION
PROGRAMS. FINAL REPORT**

A review of the literature and data from pedestrian accident research studies was used as input to an analysis which developed 14 message contents. Each of these is directed at a specific aspect of the identified pedestrian accident problem: dart-out accidents; pedestrian vehicle accidents; intersection dash accidents; vehicle turn and merge accidents; multiple threat accidents; bus stop related accidents; vendor related accidents; and freeway or expressway crossing accidents. Seven of the messages were pretested to measure behavioral change.

Of these, five produced significant positive shifts in behavior. It is concluded that public education can influence pedestrian behavior and is therefore a viable countermeasure to pedestrian accidents. Six of the message contents are recommended as ready for immediate field testing. Recommendations for media campaigns for each of the developed message contents are provided.

by R. D. Blomberg; D. F. Preusser
Dunlap and Associates, Inc., 1 Parkland Dr., Darien, Conn.
06820
Contract DOT-HS-099-3-705
Rept. No. ED-74-3 ; 1975 ; 168p 111refs
Rept. for Jun 1973-Jun 1974.
Availability: NTIS

HS-801 460

**MULTIDISCIPLINARY ACCIDENT INVESTIGATION
FINAL REPORT**

In-depth investigations of 35 selected motor vehicle accidents are summarized. Case selection criteria are explained. Description of multidisciplinary accident investigation (MDAI) case studies includes: types of impact, vehicles, and drivers involved; environmental conditions; occupants; and impact speed. The summary of the individual MDAI findings include: human, vehicle, and environmental factors in accident causation; human, vehicle, and environmental factors in injury causation; post-crash factors; and positive factors minimizing the consequences of a crash. Vehicle handling accident causation is discussed in terms of: straight-line stops; lane change or turning maneuvers on a straight roadway; braking or steering to avoid collision on a straight roadway; and braking and steering to avoid collision on a straight roadway. A brief summary of a seat belt usage study in 1973 and 1974 vehicles is included.

by R. Limpert; V. Averett; F. Gamero
Utah Univ., Multidisciplinary Accident Investigation Team,
Salt Lake City, Utah 84112
Contract DOT-HS-4-00810
1975 ; 216p
Rept. for 16 Nov 1973-30 Nov 1974.
Availability: NTIS

HS-801 473

**BODY VEHICLE INTERACTION EXPERIMENTAL
STUDY. VOL. 1. SUMMARY. FINAL REPORT**

A summary is presented of an investigation of injuries sustained by the lower body of a standing adult pedestrian when impacted with the front portion of a vehicle. Fifteen unembalmed cadavers were impacted at vehicle speeds between 10 and 30 mph with a vehicle simulation consisting of two impactors: hood edge and bumper. Various vehicle geometries and surface compliances, representative of both current production and candidate injury attenuating designs, were studied. The results indicate that injuries to the lower body of an adult pedestrian are strongly dependent upon vehi-

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cle design, particularly the height and compliance of the vehicle impact surfaces.

by H. B. Pritz; E. B. Weis; J. T. Herridge
Battelle Columbus Labs., 505 King Ave., Columbus, Ohio
43201
Contract DOT-HS-361-3-745
1975 ; 22p
Rept. for Jul 1973-Feb 1975.
Availability: NTIS

HS-801 483

UNIFORM TIRE QUALITY GRADING. EFFECT OF STATUS OF WEAR ON TIRE WEAR RATE

A proposed rule for the quality of grading of tires has been issued, and a controversy arose over the proposed method for grading the tread life of tires. The controversy involved the assumption in the rule that the inherent wear rate of tires is a constant and that the tread life of tires could be projected from short mileage tests. It was also argued that commercially produced tires were not uniform enough to serve as monitors of environmental change. Another point of contention related to the method of estimating the wear rate. Results of experiments designed to supply data relating to these questions are repeated. Twenty-seven tires including bias, bias belted, and radial were run 19,200, 25,600, or 38,400 miles, respectively, after an 800 mile break-in on a 400 mile course. The tires were measured and rotated every 800 miles. The regression line determined by the least squares method of average groove depth against mileage for each of the 27 tires was a straight line. The straight line accounted for over 99% of the variability in the data for each tire; the standard deviation about the regression lines was about 2 mils. It was also found that the tread life projected from a 6400 mile test gave on average 100% of the tread life projected at 19,200, 25,600, or 38,400 miles. A bias ply tire built under narrow quality control specification and the radial tire selected for monitoring environmental effects were very homogeneous. The bias and bias belted monitoring tires were more variable. Various methods of estimating the wear rate are discussed and the regression line method for quality grading was chosen.

by F. C. Brenner; S. R. Scheiner; A. Kondo
National Hwy. Traffic Safety Administration, Safety Res.
Lab., Washington, D. C. 20590
Rept. No. T-1014; Doc-00-25-GR-42 ; 1975 ; 33p 8refs
On cover: Tire Systems. Uniform Tire Quality
Availability: NHTSA

HS-801 485

BRAKES. A COMPARISON OF BRAKING PERFORMANCE FOR 1975 PASSENGER CARS AND MOTORCYCLES

The stopping distance reported by individual foreign and domestic automobile and motorcycle manufacturers from 60 mph with fully operational brakes under the most adverse load condition is tabulated. Stopping distances are listed for make/model in descending order of performance, and the total range of performance of all makes and models is shown on each page for comparison. The data were compiled by NHTSA from information provided by the individual motor

vehicle manufacturers in response to Department of Transportation regulations.

National Hwy. Traffic Safety Administration, Washington, D. C.
Publ: Published as Consumer Aid Series v5 pt1 (Jan 1975)
1975 ; 52p
Availability: GPO

HS-801 486

TIRES. A COMPARISON OF TIRE RESERVE LOAD FOR 1975 PASSENGER CARS

The minimum tire reserve load reported by the individual foreign and domestic auto manufacturers for all tires recommended for installation on the vehicles listed is tabulated. Tire reserve loads are listed in descending order of performance, with the total range of performance of all makes/models shown on each page for comparison. Figures apply to new vehicles, after suitable break-in and adjustment according to the regulations. The data were compiled by NHTSA from information provided by the individual motor vehicle manufacturers in response to Department of Transportation regulations.

National Hwy. Traffic Safety Administration, Washington, D. C.
Publ: Published as Consumer Aid Series v5 pt2 (Jan 1975)
1975 ; 60p
Availability: GPO

HS-801 487

ACCELERATION AND PASSING ABILITY. A COMPARISON OF ACCELERATION AND PASSING ABILITY FOR 1975 PASSENGER CARS AND MOTORCYCLES.

Acceleration and passing ability reported by individual foreign and domestic automobile and motorcycle manufacturers is tabulated. Performance is ranked by seconds of elapsed time in descending order from best to worst, with the total range of performance of all makes/models shown on each page for comparison. Figures apply to new vehicles, after suitable break-in and adjustment according to the regulations. The data were compiled by NHTSA from information provided by the individual motor vehicle manufacturers in response to Department of Transportation regulations.

National Hwy. Traffic Safety Administration, Washington, D. C.
Publ: Published as Consumer Aid Series v5 pt3 (Jan 1975)
1975 ; 70p
Availability: GPO

HS-801 488

EMERGENCY MEDICAL TECHNICIAN. CRASH VICTIM EXTRICATION TRAINING COURSE. COURSE COORDINATOR'S GUIDE

A manual for the course coordinator is presented to upgrade the skills and knowledge of the emergency medical technician (EMT), in the methods of extricating victims from crashed vehicles. The course is designed to develop the EMT's ability to establish priorities for removing the victims safely. Topics

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covered include: course outline; instructors; students and class size; training facilities; wrecked vehicle source; safety precautions and security; simulated casualties; material and equipment; testing and grading students; and visual aids, texts, and supplementary references. Lesson plans are given for removal problems, forcible entry, disentanglement and safety techniques, illustrative stories, practice (skills and training) and conclusion.

National Hwy. Traffic Safety Administration, Rescue and Emergency Medical Services Div., Washington, D. C. 1975? ; 45p 6refs

See also HS-801 489, Course Guide.

Availability: GPO \$0.95, stock no. 5003-00165

HS-801 489**EMERGENCY MEDICAL TECHNICIAN. CRASH VICTIM EXTRICATION TRAINING COURSE. COURSE GUIDE**

A manual is presented to upgrade the skills and knowledge of the emergency medical technician (EMT) in the methods of extricating victims from crashed vehicles. The course is designed to develop the EMT's ability to establish priorities for removing the victims safely. Topics covered include: mission and duties of the EMT; leadership; classification of extrication equipment and the extrication system; post-crash events and agency interactions at the accident scene, such as reporting and dispatching, rendering emergency medical care, transportation of rescuers and equipment to the scene, traffic control, controlling non-traffic hazards, gaining access, disentanglement, preparation for removal, and transportation to the ambulance. Emergency medical care procedures include evaluation at the accident scene, airway requirements, bleeding control, significance of shock, emergency fracture management, preparation for removal and transport, and victim transport to ambulance. Support functions considered are reporting and dispatching, transportation to the scene, traffic control, and hazard control.

National Hwy. Traffic Safety Administration, Rescue and Emergency Medical Services Div., Washington, D. C. 1975? ; 67p 11refs

See also HS-801 488, Course Coordinator's Guide.

Availability: GPO \$1.15, stock no. 5003-00164

HS-801 490**SCHOOL BUS SAFETY IMPROVEMENT PROGRAM. FINAL BRIEFING**

Charts, diagrams, and photographs are presented to illustrate improvements in school bus safety. The program objective was to improve the crashworthiness and accident avoidance capabilities of school buses, and to design, fabricate, and test an improved safety school bus. Structural improvements are outlined along with the test approaches and evaluations. Accident statistics are cited. Recommendations are offered for emergency exits, interior protection (seating systems), structural crashworthiness, handling and braking, and driver field of view. Results are given for braking system tests, handling tests, roof tests, and dynamic pole tests.

Ultrasystems, Inc. Dynamic Science Div., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
Contract DOT-HS-046-3-694
1975? ; 67p

Availability: NTIS

HS-801 493**NISSAN/AMF ESVS--FRONT-TO-FRONT IMPACT TEST AT 60 MPH. FINAL REPORT**

Results of an aligned front-to-front collision between a Nissan Experimental Safety Vehicle (ESV) and a 4000-lb AMF vehicle at a closure speed of 60 mph are reported. The objective of the test was to assist in the understanding of problems associated with crashworthiness in the traffic mix; i.e., car-car compatibility and aggressiveness. This crash test evaluated the structural integrity and dynamic response of the Nissan ESV and the dynamic response of its four occupants, who were involved in collision with a larger ESV. The test also investigated the potential benefits of velocity-sensitive front structures to accommodate intermediate weight vehicles, such as the Nissan ESV. The test was successful in that the head compartment integrity was adequately maintained and all occupant responses met established specifications. The AMF vehicle's hydraulic system stroked almost 19 ins compared to 29-in dynamic crush for the Nissan, indicating that the heavier AMF vehicle absorbed a significant portion of the crash energy. Based on the limited compartment intrusion and generally low levels of dummy response, a safe closing speed of at least 65 mph appears practicable.

by S. Davis; N. B. Johnson
Ultrasystems, Inc., Dynamic Science Div., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
Contract DOT-HS-4-00860
Rept. No. 2310-74-62 ; 1975 ; 194p 5refs
Availability: NTIS

HS-801 495**UNIFORM TIRE QUALITY GRADING. TRACTION VALIDATION PROGRAM. 2. VERIFICATION OF CONCRETE AND ASPHALT PADS FOR UTQG AT GOODFELLOW AFB, SAN ANGELO, TEXAS. FINAL REPORT**

Test phases are reported for evaluation of the asphalt concrete skid surfaces installed at Goodfellow AFB to determine skid numbers for each area and to test a population of pairs of commercial tires. It is shown that, on an average, commercial tires react to pavement changes in the same manner as the ASTM tire over the range of 0.44 to 0.35. It is found to be essential that the area on each surface to be used for compliance testing have at least 10 skids across the surface before any measurements are made each day. Surface preconditions and monitoring procedures are outlined.

by A. H. Neill, Jr.
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. T-1009A ; 1975 ; 20p 2refs
On cover: Tire Systems. Uniform Tire Quality Grading...
Availability: NHTSA

HS-801 502**A COMPUTER ARCHIVE OF ASAP ROADSIDE BREATHTESTING SURVEYS, 1970-1974. INTERIM REPORT**

As part of their evaluation procedures, 28 of the 35 federal sponsored Alcohol Safety Action Projects (ASAPs) cond-

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roadside breathtesting surveys of nighttime drivers between 1970 and 1974. Data from 77 of these surveys were brought together into an archive and each data set was reformatted into a single computer file containing 122 variables. The data from the 1973 national roadside breathtesting survey have also been included. This file contains breathtesting results, demographic data, information on alcohol consumption and knowledge about drinking and driving for 75,183 randomly selected drivers, plus 2701 passengers. The report contains the following: dates and sizes of the 78 surveys currently in the archive; breathtesting results by four time-day categories for each of the archived ASAP surveys; a codebook for the 122 variables in the master computer file along with the frequency and percentage distributions on each variable for the national survey and for the ASAP surveys, divided into four time periods; explanations of how the data are being stored for future use; and descriptive information about the variables being used. The grouped data show the following percentages of drivers with BACs equal to or exceeding 0.10%: 3% of weekend-early drivers; 1% of weekday-early drivers; and 6% of weekend-late and weekday-late drivers.

by R. J. Lehman; A. C. Wolfe; R. D. Kay
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy.
and Baxter Rd., Ann Arbor, Mich. 48105
Contract DOT-HS-031-3-722
Rept. No. UM-HSRI-AL-75-1 ; 1975 ; 172p 2refs
Availability: NTIS

HS-801 503

SEAT BELT USE-INDUCING SYSTEM EFFECTIVENESS. FINAL REPORT

Seat belt use inducing system effectiveness was measured in fleet automobiles of a private business and in rental automobiles at a large airport. Study vehicles were fitted with a 1974 seat belt system, a seat belt use counting system and electronic vehicle modifications which provided the following use induction methods: ignition interlock system, sequencing system, and speed limiting system. The test subjects were subjected to the use inducing systems in various sequences and for varying periods of time. There was a significant increase in seat belt use for all three methods of use inducement. There was no significant difference in seat belt use among the three methods of use induction, and no significant change of seat belt use. There was a significant difference between previous no-system seat belt use and no-system seat belt use after exposure to the use inducing system, the latter being higher. In a shoulder belt usage survey of 750 fleet vehicles, 540 (72%) showed correct shoulder belt use. In a similar observation study of rental automobiles, 1823 drivers were observed, of which 1281 (70.3%) were wearing shoulder belts, and 472 front passengers were observed, of which 287 (60.8%) were wearing them. Additional data on make of vehicle and sex of drivers and occupants were obtained in these studies. The test subjects were periodically administered a questionnaire, the results of which indicated higher self reported than actual seat belt use, and specific confusion, inconvenience, and discomfort factors.

by M. R. Appleby; L. J. Bintz
Automobile Club of Southern California, Automotive
Engineering Dept., 2601 S. Figueroa St., Los Angeles, Calif.
90007
Contract DOT-HS-223-3-638
1975 ; 47p 2refs
Rept. for Mar 1973-Sep 1974.
Availability: NTIS

HS-801 513

HS-801 511

FIELD DEMONSTRATION OF POLARIZED LIGHTING. FINAL REPORT

An ad hoc committee of the Organization for Economic Cooperation and Development, the Committee on the Application of Polarized Headlights, was assigned to develop a public test/demonstration of polarization. A cooperative public trial is proposed as the most expeditious means of evaluating the acceptability and desirability of enacting governmental mandates for the adaptation of a major improvement in vehicle headlighting to enhance night driving safety. The problems associated with headlight polarization are stated and a review of the technical areas of concern is annexed. Public acceptance and the benefits of polarization, international cooperation and coordination, and the evaluation approach are seen as aspects of a solution. The organization and conduct of the public trial/demonstration are discussed in terms of planning for an international experiment; development of a test plan; test site evaluation and selection; orientation of public; operational support; and test organization, administration, and schedule. Experiment costs are estimated, proposed sites evaluated, and recommendations given. Behavioral problems associated with a transition to polarized vehicle lighting are discussed in a second annex.

by R. H. Hemion
Southwest Res. Inst., 8500 Culebra, San Antonio, Tex. 78284
Contract DOT-HS-4-00924
Rept. No. AR-977 ; 1975 ; 89p 10refs
Rept. for 30 May 1974-30 Apr 1975.
Availability: NTIS

HS-801 513

A REVIEW OF THE INTERNATIONAL EXPERIMENTAL SAFETY VEHICLE PROJECT (NON-U.S.). FINAL REPORT

Progress of the International Experimental Safety Vehicle (ESV) Project (Non-U.S.) through the time of the Fourth International Technical Conference on Experimental Safety Vehicles (March, 1973) is reviewed. The topical framework for the review includes: vehicle design, including ESV design approaches; the technology of accident avoidance, including power train technology, brake subsystems, steering and suspension, visibility, vehicle controls, and displays; the technology of crash energy management, including crash energy management in front, side, and rear impacts, and rollovers, and for pedestrian safety; and the technology of postcrash safety, including fire prevention and protection, and emergency egress and extrication. It is concluded that, in general, the International ESV Project has met its basic objectives.

by R. D. Vergara; G. H. Alexander; J. T. Herridge
Battelle Columbus Labs., 505 King Ave., Columbus, Ohio
43201
Contract DOT-HS-322-3-621
Rept. No. DOT-HS-322-3-621-2 ; 1974 ; 225p refs
Rept. for Feb 1973-Oct 1974.
Availability: Reference copy only

HS-801 514

HSL 75-8

HS-801 514

**HIGHWAY SAFETY PROGRAM MANUAL. VOL. 8.
ALCOHOL IN RELATION TO HIGHWAY SAFETY**

Designed as a guide for states and their subdivisions to use in developing highway safety program policies and procedures, the manual provides information on the extent to which the immoderate use of alcohol is a factor in highway crashes, and serves as the basis both for resource allocations and for determining the effectiveness of countermeasures. Program development and operations are detailed, including: planning, chemical and behavioral tests, technical qualifications of operative personnel, tests following fatal crashes, and implied consent. Additional chapters cover program evaluation, reports, local government participation, Highway Safety Program Standard 8, representative projects, resource organizations, alcoholic influence report form, and minimum educational and experience requirements for laboratory personnel for chemical testing of blood and/or urine.

National Hwy. Traffic Safety Administration, Washington, D.C.

1975 ; 65p refs

Supersedes HS-820 044. Vols. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v9 is HS-801 466, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.

Availability: GPO

component availability finds quantitative traffic flow and vehicle dynamics models available at various levels of complexity, driver performance in a closed-loop control task models available, and driver open-loop response models available in limited numbers. The preferred approach for further development of the model is to preprogram a number of critical situations, which may be selected from state and local accident data, analyze them, create models representing a majority of accident producing situations, and, by examining submodels of driver behavior, define the driver algorithm for specific critical situations and applications, to provide a basis for specifying driver behavioral data requirements. Model validation requirements and plan are given, and user considerations noted. Appendices cover data formulated for driver model algorithm, swerve-merge probability model development, vehicle lateral accelerations, and a demonstration model program listing.

by P. A. Anderson; K. L. Curtner; J. D. Wolf
Honeywell, Inc., Systems and Res. Center, 2600 Ridgeway
Pkwy., Minneapolis, Minn. 55413
Contract DOT-HS-4-01008

Rept. No. F3414-FR ; 1975 ; 115p 118refs
Rept. for Jun 1974-Jan 1975.

Availability: NTIS

HS-801 526

TOYOTA/AMF--2 ESVS--FRONT-TO-FRONT IMPACT TEST AT 60 MPH. FINAL TEST REPORT. JULY 1974

Results are presented of an aligned front-to-front collision between a Toyota Experimental Safety Vehicle (ESV) and a 4000-lb AMF ESV at a closing speed of 60 mph. The objective was to assist in the understanding of problems associated with crashworthiness in the traffic mix; i.e., car-to-car compatibility and aggressiveness. This crash test evaluated the structural integrity and dynamic response of the Toyota ESV and the dynamic response of its two occupants, when involved in a collision with a larger ESV. The test also investigated the potential benefits of velocity-sensitive front-end structures to accommodate intermediate weight vehicles such as the Toyota ESV. The test was successful in that Toyota compartment integrity was adequately maintained and all occupant responses met established specifications. The AMF vehicle's hydraulic system stroked almost 20 inches, indicating that the heavier AMF vehicle absorbed a significant portion of the crash energy. The coefficient of restitution as well as the Toyota vertical accelerations were determined since these parameters influence restraint system performance. Based on the negligible compartment intrusion and the generally low levels of dummy response, a safe closing speed of at least 65 mph appears practicable.

Ultrasystems, Inc., Dynamic Science Div., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
Contract DOT-HS-4-00860
Rept. No. DS-2310-74-63 ; 1975 ; 136p 5refs
Availability: NTIS

HS-801 525

DRIVEM: DRIVER-VEHICLE INTERACTION EFFECTIVENESS MODEL. FINAL REPORT

The first phase of an effort to develop a computer model for rapid and valid predictions of accident reduction due to proposed traffic safety improvements is described. This computer model concept, Driver-Vehicle Interaction Effectiveness Model (DRIVEM), is a feasible method for predicting accident reduction potential. Work in this phase concentrated on four areas: identification of system performance variables; conceptual model development; model implementation; and a refinement and validation plan development. An integrated "library of models" approach is preferred to a completely general single model for the model structure. The assessment of model

OCCUPANT SURVIVABILITY IN LATERAL COLLISIONS. PROGRESS REPORT, NO. 5, 1 DECEMBER TO 31 DECEMBER 1974

Three baseline side impact tests were performed during the reporting period and are described, with photographs and exten-

August 29, 1975

HS-801 534

sive data included. Detailed analysis of the test data, particularly the dummy kinematics and contact responses, will continue during the next reporting period. Developmental testing of glazing materials was completed, and several materials of laminated construction were subjected to headform drop tests. These were two-ply annealed glass with .015 in. PVB interlayer, two-ply annealed glass with .030 in. PVB interlayer (HPR windshield type), two-ply tempered glass with .030 in. PVB interlayer, and PPG bilayer exposed plastic with 5/32 in. tempered glass outside layer. Results of the impact tests indicate that two types can be eliminated: the thin PVB interlayer, and the two-ply 5/32 in. tempered laminate. Fabrication of the five modified 1973 Ford automobiles continued on schedule.

by J. E. Greene
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00922
Rept. No. ZS-5562-V; PR-5 ; 1974 ; 143p
Availability: NHTSA

HS-801 532

OCCUPANT SURVIVABILITY IN LATERAL COLLISIONS. PROGRESS REPORT NO. 6, 1 JANUARY TO 31 JANUARY 1975

The final test in the series of five baseline crash tests was performed and complete data packages for tests 3, 4, and 5 are presented, including structural and dummy performance data. Based on impact performance test results, the side glazing laminated constructions to be used in the modified vehicles will be limited to the two-ply annealed glass configuration with .030 in PVB interlayer (HPR windshield type), and the PPG bilayer configuration with 5/32 in tempered glass outside layer and .030 in plastic (proprietary PPG material) inside layer. No evidence of PVB interlayer of PPG plastic inside layer tearing or pulling away from the peripheral support was observed, with a single exception. Fabrication of the structural modifications for the five test vehicles was completed during this reporting period.

by J. E. Greene
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00922
Rept. No. ZS-5562-V; PR-6 ; 1975 ; 175p
Availability: NHTSA

HS-801 533

FEASIBILITY STUDY OF PLASTIC AUTOMOTIVE STRUCTURE. PROGRESS REPORT, MARCH 1975

The integration of plastics in automotive structures was studied. A curved panel was fabricated and test plans made. The radiator mounting and suspension cross member designs have not been finalized due to unknowns in the crushed 1974 Pinto

being used as a test buck. Most of the effort has been directed at completing or repairing the Pinto test vehicle. Repair methods for glass reinforced polyester moldings have been researched, and a test element has been fabricated using two previously tested cylinders.

by H. A. Jahnle
Budd Co. Technical Center, 300 Commerce Dr., Ft. Washington, Pa. 19034
Contract DOT-HS-4-00929
Rept. No. PR-Mar-75 ; 1975 ; 17p
Availability: NHTSA
HS-801 534

ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUBCOMPACT SIZE VEHICLE FRONT SEAT PASSENGERS. PROGRESS REPORT NO. 9, 3 MARCH 1975 TO 31 MARCH 1975

Results of evaluation sled tests are presented, including injury criteria plotted as a function of sled velocity. Sequence camera photographs for the runs conducted during the month are given, and photographs are also presented for the crushed components, where applicable. Photographs of the 95th percentile dummy on the sled buck and in the Pinto mock-up are shown.

by D. J. Romeo
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00972
Rept. No. ZM-5566-V; PR-9 ; 1975 ; 19p
Availability: NHTSA

ANALYSIS OF THE FRENCH AUTO ACCIDENT COMPENSATION SYSTEM

Present laws regarding the French automobile accident compensation system are reviewed along with the criticisms directed at them, and the main reform proposals. The essentials of the present system are considered in terms of the law of tort, social security and other collateral benefits, and coordination of tort compensation and collateral benefits. Criticisms of the law are examined with regard to both practical and theoretical defects. It is shown that since almost all road users commit errors and since these errors may be harmless or may produce tragic consequences according to the circumstances, the present settlement of traffic cases on the basis of negligence is a costly, long process of settlement on the basis of chance. The Tunc proposal and the Bedour proposal are detailed as reform examples.

by A. Tunc
University of Paris (France)
Publ: HS-008 050, COMPARATIVE STUDIES IN AUTOMOBILE ACCIDENT COMPENSATION, Washington, 1970 p1-32
1970 ; refs
Department of Transportation Automobile Insurance and Compensation Study.
Availability: In HS-008 050

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**ALCOHOL SAFETY ACTION PROJECT
EVALUATION SYSTEM**

Software is to be developed to produce a visual display capability for displaying performance and management information in narrative, graphic, and numeric modes. Ten (10) quarterly Alcohol Safety Action Project (ASAP) progress reports will be reviewed and the appropriate data extracted for input into the system for visual display access. Contractor will develop recommended report formats based on selected data elements and develop the necessary software compatible with the existing evaluation data system to complete the report generation and display task. User and system documentation will be prepared. 0e t

Teknekron, Inc. 2118 Milvia St. Berkeley, Calif. 94704
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**TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC
ACCIDENTS**

By analyzing a number of accident avoidance emergency situations related to single vehicle accidents, the contractor shall identify the frequency with which each type of situation occurs. The proportion of single and two vehicle accidents that could not be avoided are to be identified by such factors as driver recognized emergency too late to execute an avoidance maneuver; escape route was blocked by other vehicles, roadside obstructions, etc.; and driver was unable to execute a successful avoidance maneuver due to alcohol. Determination of relationship (if any) between accident severity and the emergency situations will be made and a system of maneuvers for recovering from the emergency situations where there is avoidance potential is to be developed. By identifying behavioral errors and comparing them to behaviors associated with the recommended recovery maneuvers the contractor shall determine the probability of success associated with each maneuver for each emergency situation. Analysis will be based on the Indiana Multidisciplinary Accident Investigation (MDAI) indepth file of 372 accidents encompassing 613 drivers. A small sample of MDAI urban area accidents and of MDAI freeway accidents will be analyzed to determine whether there is a need to modify the emergency situation and the maneuver analyses that are based solely on Indiana's files. Results are to be consolidated with those of the two-vehicle accident analyses performed under the subcontractor to URS Matrix Company. 0tio

Indiana University Foundation Box F Bloomington, Ind. 47401
Extended to 30 Sep 75
Increased \$23,249.00

DOT-HS-031-3-749 Mod. 3

**VALIDATION STUDIES FOR HEAD IMPACT INJURY
MODEL**

University of Michigan 260 Research Administration Bldg.
Ann Arbor, Mich. 48105
Extended through 31 Aug 75
Increased \$12,000.00

DOT-HS-032-1-036 Mod. 17

LATERAL COLLISION TEST PROGRAM

Using a 4,000-pound car as the striking vehicle, a lateral impact test on a school bus will be made. Impact speed at 29.4 ± 0.5 mph will be directed to the centerline of the bus fuel tank and will be normal to the longitudinal axis of the school bus. A second test on a school bus will use a 4,000-pound contoured moving barrier as the striking vehicle. Fuel leakage will be measured for a 30-minute period following each crash test in accordance with FMVSS 301. Off-board cameras will be positioned for each test and still photographs will be made of any significant damage. Four (4) additional passenger vehicles will be impacted in the side with the contoured moving vehicle at a velocity of 20 ± 0.5 mph. On-board instrumentation will be in-

DOT-HS-036-3-712 Mod. 3

**MODEL POLICE TRAFFIC SERVICES POLICY
DOCUMENT AND MODEL PROCEDURES MANUAL
FOR POLICE SERVICES**

A MODEL RULES AND REGULATIONS MANUAL FOR POLICE TRAFFIC SERVICES will be developed. This is in addition to the MODEL POLICE TRAFFIC SERVICE POLICY DOCUMENT developed in the first year of this contract, and the MODEL POLICE TRAFFIC SERVICES PROCEDURE DOCUMENT developed in the second year.

International Association of Chiefs of Police, Inc. Eleven
Firstfield Road Gaithersburg, Md. 20760
To be completed 30 Jun 76
Increased \$69,993.00

DOT-HS-037-1-044 Mod. 17

HSL 75-8

DOT-HS-037-1-044 Mod. 17

ALCOHOL SAFETY ACTION PROJECT

A two (2) year continuation of the Cumberland-York County Alcohol Safety Action Project will provide monthly and/or quarterly post-operational reports for the period January 1, 1975 through December 31, 1976. Two (2) annual reports are due on June 30, 1976 and June 30, 1977 respectively. 0 MO

Maine Department of State Motor Vehicle Division 242 State St. Augusta, Me. 04330
Extended to 30 Jun 77
Increased \$31,000.00

DOT-HS-038-1-045 Mod. 18

ALCOHOL SAFETY ACTION PROJECT, RICHLAND COUNTY, COLUMBIA, SOUTH CAROLINA

A two-year extension of the evaluation of the Richland County Alcohol Safety Action Project (ASAP) is to provide additional reports for the post-operational period, January 1, 1975 through December 31, 1976. Some monthly and quarterly reports will be made, and two annual reports will be submitted on June 30, 1976 and June 30, 1977.

South Carolina Commission on Alcoholism 1611 Devonshire Drive Columbia, S. C. 29204
To be completed 30 Jun 77
Increased \$37,245.00

DOT-HS-4-00903 Mod. 3

DEVELOPMENT AND APPLICATION OF VEHICLES RATING CRITERIA FOR DAMAGE, SUSCEPTIBILITY, CRASHWORTHINESS AND REPAIRABILITY

The contractor shall collect data from insurance files as set forth in his proposal of February 6, 1975 as revised March 10, 1975.

General Electric Company Information Systems Programs 1400 Wilson Boulevard, Suite 1100 Arlington, Va. 22209
No change
Increased \$21,374.00

DOT-HS-4-00909 Mod. 2

CONSUMER INFORMATION CRASH TEST PROGRAM

Based on experience gained during Phase I testing, the scope of the Phase II test program is modified to cover a series of crash tests performed on 1974 intermediate-size vehicles to include four (4) front/barrier tests and two (2) front-rear tests on each vehicle; and a series of eleven (11) component tests to be conducted on each of the vehicles.

Ultrasystems, Inc. Dynamic Science Division 1850 West Pinnacle Peak Rd. Phoenix, Ariz. 85027
No change
Increased \$69,627.00

DOT-HS-4-00910 Mod. 2

CONSUMER INFORMATION CRASH TEST PROGRAM

Based upon experience gained during Phase I testing, Phase II is revised to provide full scale crash testing of two (2) vehicles. Two (2) fifteen (15) mph frontal barrier tests are eliminated. Mathematical modeling prediction of a vehicle as provided in Option B-1 will be undertaken. 0 ea

No change
Increased \$74,791.00

DOT-HS-4-00913 Mod. 2

COLLISION AVOIDANCE RADAR BRAKING SYSTEM INVESTIGATIONS

Upon definition of the system, operation, and performance elements as determined in Phase I, a priority assignment of importance and need for further study was arrived upon. These unresolved elements will be investigated in Phase II.

The Bendix Corporation Research Laboratories 20800 Ten and One-Half Mile Rd. Southfield, Mich. 48075
Extended to 29 Jan 76
Increased \$100,000.00

DOT-HS-4-00916 Mod. 2

INCREASE CAPACITY OF INERTIA DYNAMOMETER

Paragraph 2.1.3 is expanded to modify B end of existing brake dynamometer to allow tailstock to travel an additional 24 inches to accommodate truck brake test fixtures. Paragraph 2.3.3 is expanded to install double end hydraulic and single end pneumatic servo control valve units.

Greening Associates, Inc. 19465 Mt. Elliot Ave. Detroit, Mich. 48234
Extended to 29 Aug 75
Increased \$6,950.00

DOT-HS-4-00921 Mod. 3

QUANTIFICATION OF THORACIC RESPONSE AND INJURY

The present test matrix will be expanded to include an additional twenty-four (24) cadaverous test specimens. Tests will be conducted with a simple, repeatable test device such as the present compliance test pendulum for Part 572. Impact conditions will be limited to three (3) modes which will be decided upon with the Contract Technical Manager (CTM). Dynamic instrumentation and all injury assessments subsequent to impact will be consistent with and be performed as in the present test matrix.

Regents of the University of Michigan 260 Research Administration Bldg. Ann Arbor, Mich. 48104
To be completed 31 Dec 76
Increased \$89,185.00

August 29, 1975

DOT-HS-4-00922 Mod. 3

OCCUPANT SURVIVABILITY IN LATERAL AND ROLLOVER COLLISIONS

The contractor shall perform two (2) additional full-scale vehicle baseline tests employing one (1) SAE moving barrier, two (2) unmodified 1973 four (4) door Ford pillared hardtops, and one (1) 1973 four (4) door Ford pillared hardtop modified with a 1974 bumper for the same model vehicle. In the first of these tests the striking vehicle will be a rigid moving barrier surface, surface of which is a contoured bumper. The struck vehicle will be an unmodified 1973 Ford four (4) door pillared hardtop with the same instrumentation and dummy location as in the previous baseline tests. The one (1) exception to the instrumentation is that the hood camera should be elevated to give a better view of the armrest-dummy pelvis interaction. The second test will be identical with baseline test four (4) with the exceptions that the hood camera of the struck vehicle will be elevated to give a better view of the armrest-dummy pelvis interaction, and the initial point of contact of the striking vehicle will be such that the edge of the striking vehicle moves along a line through a point eight (8) inches to the right of the inboard-most door opening reference point. Data will be analyzed in the same manner as data of the first five (5) baseline tests.

Calspan Corporation 4455 Genesee St. Buffalo, N.Y. 14224
No change
Increased \$14,718.00

DOT-HS-4-00927 Mod. 4

SOLID-STATE DIGITAL DATA RECORDER FOR MONITORING ANTHROPOMORPHIC DUMMY IMPACT ENVIRONMENTS

Kaman Science Corporation 1500 Garden of the Gods Road Colorado Springs, Colo. 80907
Extended to 7 Oct 75
Increased \$45,935.00 Olin

DOT-HS-4-00941 Mod. 2

COMPARISON OF DRUG USE IN DRIVER FATALITIES AND SIMILARLY EXPOSED DRIVERS

Modification stipulates that the data from control drivers be collected within six (6) weeks after the corresponding fatality.

Midwest Research Institute 125 Volker Blvd. Kansas City, Mo. 64110
No change
Increased \$98,000.00

DOT-HS-4-00952 Mod. 1

EXPERIMENTAL FIELD TEST OF PROPOSED PEDESTRIAN SAFETY MESSAGES

Pedestrian safety messages in media form supplied by the contractor for field testing purposes will include 35 mm film and color posters with dart-out messages for children; television

DOT-HS-4-00965 Task Order No. 6

and radio spots for vehicle turn/merge messages; and television and radio spots for multiple threat messages. veh

Dunlap and Associates, Inc. One Parkland Drive Darien, Conn. 06820
To be completed 31 Dec 75
Increased \$168,330.00

DOT-HS-4-00961 Mod. 1

PEDESTRIAN IMPACTS: BASELINE AND PRELIMINARY CONCEPTS EVALUATION

Battelle Memorial Institute Columbus Laboratories 505 King Ave. Columbus, Ohio 43201
Extended to 30 Mar 76
Increased \$99,900.00

DOT-HS-4-00963 Mod. 1

MARK II INTEGRATED DRIVER VISION TESTS

The contractor will modify the hardware and software of the Mark II device as agreed upon with the Contract Technical Manager (CTM), and will incorporate the suggestions elicited from a group of twenty (20) subjects who have been tested. A booklet to be given to drivers prior to testing will be drafted with the objective of familiarizing drivers with the device, tests, and procedures. The vision test will be administered to a chosen sample of licensed drivers age 55-65 and over, the scores recorded and suggestions for improvement of instruction will be taken. Testing will be repeated as necessary for final revision so that 85% of drivers over 55 years of age will be able to achieve threshold scores distributed through-out the stimulus range on each test. A sample of drivers will be tested and retested to determine reliability of the scores. Revised specifications of the Mark II are to be provided reflecting all modifications made to the device as result of the testing.

Honeywell, Inc. Systems Research Center 2700 Ridgeway Parkway Minneapolis, Minn.
Extended to 11 Jul 75
Increased \$54,607.00

DOT-HS-4-00965 Task Order No. 6

DEVELOPMENT OF NEW AND IMPROVED COUNTERMEASURES PROGRAMS FOR ALCOHOL RELATED HIGHWAY CRASHES

The Council's Committee on Alcohol and Drugs will review proposed plans for distribution and use of breath testing devices. The committee will assist the States in formulating and implementing an evaluation of the Screening Breath Alcohol Test devices and operational procedures. Technical specialists with traffic records, enforcement and statistical evaluation expertise will review the program and assist the applicant States in formulating and implementing the evaluation of it. Osti

National Safety Council 425 North Michigan Ave. Chicago, Ill. 60611
No change
\$9,378.82

DOT-HS-4-00968 Mod. 4

HSL 75-8

DOT-HS-4-00968 Mod. 4

DEVELOPMENT OF A LOW COST PORTABLE FLUORIMETRY TECHNOLOGY FOR DETECTION AND QUANTIFICATION OF CANNABANOID IN BODY FLUIDS AND BREATH

A previously unreported marihuana metabolite has been uncovered by the contractor's research. This metabolite is present in high concentration and can be detected at least five (5) days after marihuana smoking. It was found consistently in all marihuana users and in none of the controls. This new metabolite is to be isolated using human plasma as the source, and its structure is to be identified using a variety of instrumental techniques. Methods of quantifying this metabolite and determining the concentration-time curves in the blood and breath of marihuana smokers are to be developed. Recommendations on how the quantitative analysis for the new metabolite can be used in traffic safety to identify marihuana users and to determine concentration of marihuana at time of an accident from samples taken at interval following the accident are to be reported.

University of Missouri 817 Clark Hall Columbia, Mo. 65201
To be completed twelve (12) months from date of modification award
Increased \$35,000.00

DOT-HS-4-00970 Mod. 2

TRAFFIC OFFENSE SENTENCING PROCESSES AND HIGHWAY SAFETY

Public Systems, Inc. 1137 Kern Ave. Sunnyvale, Calif. 94086
Extended to 31 Oct 75
Increased \$11,461.00

DOT-HS-4-00978 Mod. 4

RECREATIONAL VEHICLE SURVEY

Pioneer Engineering and Mfg. Company 2500 E. Nine Mile Rd.
Warren, Mich. 48091
Extended to 1 Mar 76
Increased \$19,956.49

DOT-HS-4-00987 Mod.1

MATERIALS DEVELOPMENT FOR POLICE MANAGEMENT TRAINING PACKAGE ON FACTORS INFLUENCING DWI ARRESTS

One (1) additional pilot test will be included in the original contract performance.

Dunlap and Associates, Inc. One Parkland Drive Darien, Conn. 06820
Extended to 31 Jul 75
Increased \$8,716.00

DOT-HS-042-3-783 Delivery Order No. 7

LABORATORY TEST PROCEDURES

Testing of ten (10) buses will be done in accordance with FMVSS No. 217 dated May 21, 1973 (NHTSA Laboratory Test Procedure). Orac

Ogden Technology Lab., Inc. 1536 East Valencia Drive Fullerton, Calif. 92631
No change
\$18,950.00

DOT-HS-045-1-061 Mod. 24

ALCOHOL SAFETY ACTION PROJECT

Work is to continue in accordance with the basic detailed plan dated December 15, 1971. Four (4) annual progress reports covering the period January 1 - December 31 of each year of the contract, commencing January 1, 1972, are to be prepared and submitted no later than June 30 following the year reported on. 0g.

State of South Dakota Department of Public Safety Division of Highway Safety Pierre, S.D. 57501
Extended to 30 Jun 77
Increased \$372,173.00

DOT-HS-048-1-064 Mod. 23

ALCOHOL SAFETY ACTION PROJECT

Work shall continue in accordance with the original contract as amended February 15, 1975. Four (4) annual progress reports are to be prepared and submitted. These reports are to cover the period January 1 through December 31 of each year of the contract, commencing January 1, 1972, and are to be submitted no later than June 30 following the year reported on. us

Department of Public Safety State of Minnesota 211 Highway Building St. Paul, Minn. 55101
Extended to 31 May 77
Increased \$451,297.00

DOT-HS-049-1-065 Mod. 19

ALCOHOL SAFETY ACTION PROJECT

Authorization is given to continue work through April 30, 1975. Four (4) annual progress reports covering the period January 1 through December 31 of each year of the contract, beginning with January 1, 1972, are to be prepared and submitted no later than June 30 following the year reported on.

Alcohol Safety Action Project City of San Antonio 303 South Alamo St. San Antonio, Texas 78203
Extended to 30 Jun 77
Increased \$409,292.00

August 29, 1975

DOT-HS-5-01083 Delivery Order No. 2

DOT-HS-5-01017 Task Order No. 3

LABORATORY TEST PROCEDURES

Performance tests of improved passenger restraint systems for subcompact cars will be accomplished in accordance with the original work statement.

Calspan Corporation P.O. Box 235 Buffalo, N.Y. 14221
To be completed one (1) year from date of Task Order
\$49,773.00

DOT-HS-5-01039 Mod. 2

SAFETY BELT INTERLOCK SYSTEM USAGE SURVEY

A telephone survey of drivers/owners of 1975 model Volkswagen "Rabbits" will be conducted. 3,000 of those contacted will be drivers/owners of vehicles equipped with passive safety belt systems. 1,000 of the persons contacted will be drivers/owners of vehicles equipped with active safety belt systems.

Opinion Research Corporation North Harrison St. Princeton,
N.J. 08540
To be completed four (4) months from date of this
modification
Increased \$24,940.00

DOT-HS-5-01047 Mod. 2

UNIFORM TIRE QUALITY - TREADWEAR

The "city" test phase of the original contract, without preliminary evaluation and with twice as many maneuvers per 100 miles for a total of 3,000 miles, will be repeated. The extra background of this additional test will provide a major step forward in the program to shorten and cheapen treadwear tests. cle

Compliance Testing, Inc. 1140 N. Freedom Rd. P.O. Box 351
Ravenna, Ohio 44266
No change
Increase \$6,480.00

DOT-HS-050-1-066 Mod. 22

ALCOHOL SAFETY ACTION PROJECT

Period of performance is extended for two (2) years. Some post-operational data and reports are to be furnished on a monthly and quarterly basis with two (2) annual reports being due on June 30, 1976 and June 30, 1977, respectively.

City of Cincinnati Department of Safety City Hall, Room 106
9th and Plum Streets Cincinnati, Ohio 45202
Extended through 30 Jun 77
Increased \$20,000.00

DOT-HS-5-01068 Mod. 2

UNIFORM TIRE QUALITY GRADING TREADWEAR COURSE MONITORING

Southwest Research Institute 8500 Culebra Rd. San Antonio,
Texas 78284
To be completed by 31 Aug 75
Increased \$24,124.00

DOT-HS-5-01074 Delivery Order No. 2

LABORATORY TEST PROCEDURES

Two (2) passenger vehicles will be tested in accordance with FMVSS Nos. 204, 212, and 301 dated May 18, 1973 (NHTSA Laboratory Test Procedures)

General Environments Corporation 6840 Industrial Rd.
Springfield, Va. 22151
No change
\$11,730.00

DOT-HS-5-01075 Delivery Order No. 2

LABORATORY TEST PROCEDURES

Testing of seven (7) passenger vehicles will be conducted in accordance with FMVSS Nos. 204, 212, and 301 dated May 18, 1973 (NHTSA Laboratory Test Procedure) 0rni

Agbabian Associates 250 North Nash St. El Segundo, Calif.
90245
No change
\$37,814.00

DOT-HS-5-01082 Delivery Order No. 2

LABORATORY TEST PROCEDURES

Testing of five (5) passenger vehicles will be conducted in accordance with FMVSS No. 124 dated September 16, 1974 (NHTSA Laboratory Test Procedure) On a

Ball Brothers Research Corp. Aerospace Division P. O. Box
1062 Boulder, Colo. 80302
No change
\$34,725.00

DOT-HS-5-01083 Delivery Order No. 2

LABORATORY TEST PROCEDURES

Fifteen (15) passenger vehicles will be tested in accordance with FMVSS No. 124 dated September 16, 1974 (NHTSA Laboratory Test Procedure) 0est

General Environments Corporation 6840 Industrial Rd.
Springfield, Va. 22151
No change
\$52,005.00

DOT-HS-5-01084 Delivery Order No. 2

LABORATORY TEST PROCEDURES

Ten (10) motor vehicles are to be tested in accordance with FMVSS No. 103 dated September 16, 1974 (NHTSA Laboratory Test Procedure). These vehicles will be equipped with video taping. ann

Ogden Technology Labs., Inc. 1536 East Valencia Drive P.O. Box 4158 Fullerton, Calif. 92631
No change
\$21,200.00

DOT-HS-5-01086 Delivery Order No. 2

LABORATORY TEST PROCEDURES

Five (5) motor vehicles will be tested in accordance with FMVSS No. 104 dated September 16, 1974 (NHTSA Laboratory Test Procedure). These vehicles will be equipped with video taping. vid

General Environments Corporation 6840 Industrial Rd.
Springfield, Va. 22151
No change
\$5,225.00

DOT-HS-5-01091

LIGHT SCATTERING ON WINDSHIELDS

The haze or scattering of light caused by dirt, scratches and various forms of precipitation on windshields will be tested. Tinted, hybrid, and clear glass will be used under day and night ambient light levels at rake angles of 45°, 55°, and 60° from the vertical. Results of this testing will support amendments to Standards 103 and 105 which regulate windshield defrosters, defoggers, washers and wipers, and furnish guidelines for future standards. Thi

National Bureau of Standards Washington, D.C. 20234
To be completed 31 Jul 75
\$23,200.00

DOT-HS-5-01093 Mod. 3

NATIONAL DRIVER REGISTER SYSTEM DESIGN

Rockwell International Corporation 1701 North Fort Myer Drive Suite 1104 Arlington, Va. 22209
No change
Increased \$11,945.00 Ocra

DOT-HS-5-01098

MOTOR VEHICLE DIAGNOSTIC INSPECTION DEMONSTRATION PROJECT

Inspection of motor vehicles provides a basis for evaluating vehicle safety, vehicle emissions, and total cost of vehicle repairs. The goal of evaluation is to determine if a national diagnostic inspection program would be cost effective in the

sense that the public benefits would exceed the program costs. Concept of the project is to have all of a car's inspections performed at one point and to get helpful diagnostic information when needed. States would provide the required information and data to the National Highway Traffic Safety Administration (NHTSA). Costs of the demonstration project will be concerned with administrative costs, diagnostic center operational costs, and costs to the individual motorists. Benefits are defined as accrued advantages to the public and include safer vehicles and reduced accidents, reduced emissions, aggregate repair, maintenance and fuel cost savings, and higher resale value or longer vehicle life. The project shall be designed and operated to conduct the following inspections: periodic safety and emission inspections at intervals not to exceed six (6) months; whenever the title is transferred to another person except for the purpose of resale; whenever the car sustains substantial damage to any safety-related or emission-related system or subsystem; and reinspection of cars which initially fail to meet the safety and emission standards established for the project after repair. Accidents involving vehicles in the program, including severity, are to be reported. The District of Columbia is expected to describe all data to be gathered along with the proposed data forms for approval by NHTSA. An operating procedures manual is to be established, maintained, and delivered to NHTSA describing in detail criteria, policies, personnel, training and facilities necessary to implementation of this program.

District of Columbia Washington, D.C. 20006
To be completed twenty-one (21) months from date of contract award
\$1,216,733.00

DOT-HS-5-01099 Task Order No. 1

CAR-TO-CAR AND CAR-TO-BARRIER IMPACT TESTING

High speed impact tests of full-size and subcompact automobiles will be conducted to: select a limited number of cars which have front structural stiffness characteristics that can be classified as stiff, nominal, soft, and crashworthy; and, to test these vehicles in frontal rigid barrier impacts and car-to-car impacts in order to classify each as to degree of stiffness. Eight (8) vehicle-to-rigid-flat-barrier crash tests and four (4) car-to-car crash tests will be performed. Each test vehicle will contain two (2) instrumental anthropomorphic dummies. Resultant data will be analyzed by the contractor.

Calspan Corporation 4455 Genesee St. Buffalo, N.Y. 14221
To be completed 9 Oct 75
\$99,293.00

DOT-HS-5-01106

BRAIN INJURY INDICATORS IN WHIPLASH HEAD MOTIONS

Under carefully controlled conditions of head rotation obtained with the HAD III device, increasing levels of input acceleration will be applied to laboratory test animals to obtain

August 29, 1975

DOT-HS-051-1-067 Mod. 21

data on head impact for use in an effort to isolate injury indicators.

Armed Forces Radiobiology Research Institute Bethesda, Md.
20014
To be completed 30 Sep 76
\$252,200.00

DOT-HS-5-01121

TRAFFIC LAWS ANNOTATED, DRIVER LICENSING LAWS ANNOTATED, VEHICLE INSPECTION LAWS ANNOTATED, TRAFFIC LAWS COMMENTARY: RULES OF THE ROAD RATED

Research, preparation and delivery to the National Highway Traffic Safety Administration (NHTSA) of 300 copies of the third annual supplement to TRAFFIC LAWS ANNOTATED (1972) will be made. 300 copies of the second supplement to both DRIVER LICENSING LAWS ANNOTATED (1973) and INSPECTION LAWS ANNOTATED (1969) will also be delivered. Manuscripts of traffic law commentaries entitled RULES OF THE ROAD RATES, STATE OCCUPATIONAL DRIVER LICENSING LAWS, and STATE DRIVER LICENSE CLASSIFICATION LAWS will be prepared for NHTSA.

National Committee on Uniform Traffic Laws and Ordinances
1776 Massachusetts Ave., N.W. Suite 430 Washington, D.C.
20036
To be completed 31 May 76
\$80,000.00

DOT-HS-5-01125 Delivery Order No. 1

LABORATORY TEST PROCEDURES

200 new pneumatic tires will be tested in accordance with FMVSS No. 109 (NHTSA Laboratory Procedure) dated April 1, 1974.

Dayton T. Brown, Inc. Church St. Bohemia, N.Y. 11716
To be completed one (1) year from date of contract award
\$23,000.00

DOT-HS-5-01126 Delivery Order No. 1

LABORATORY TEST PROCEDURES

200 new pneumatic tires will be tested in accordance with FMVSS No. 109 (NHTSA Laboratory Test Procedure) dated April 1, 1974. 150 retread pneumatic tires will be tested in accordance with FMVSS No. 117 (NHTSA Laboratory Procedure) dated April 1, 1974. 0 to

Electrical Testing Labs., Inc. 2 East End Ave. New York,
N.Y. 10021
To be completed one (1) year from date of contract award
\$24,400.00

DOT-HS-5-01127 Delivery Order No. 1

LABORATORY TEST PROCEDURES

150 new pneumatic tires will be tested in accordance with FMVSS No. 109 (NHTSA Laboratory Test Procedure) dated April 1, 1974. 100 retread pneumatic tires will be tested in accordance with FMVSS No. 117 (NHTSA Laboratory Test Procedure) dated April 1, 1974.

Compliance Testing, Inc. 1150 N. Freedom St. Ravenna, Ohio
44266

To be completed one (1) year from date of contract award
\$22,100.00

DOT-HS-5-01128 Delivery Order No. 1

LABORATORY TEST PROCEDURES

100 retread pneumatic tires will be tested in accordance with FMVSS No. 117 (NHTSA Laboratory Procedure) dated April 1, 1974. 0 una

Automotive Research Associates, Inc. 5404 Bandera Rd. San Antonio, Texas 78238
To be completed one (1) year from date of contract award
\$5,500.00

DOT-HS-5-01129 Delivery Order No. 1

LABORATORY TEST PROCEDURES

150 new pneumatic tires will be tested in accordance with FMVSS No. 109 (NHTSA Laboratory Test Procedure) dated April 1, 1974. 150 retread pneumatic tires will be tested in accordance with FMVSS No. 117 (NHTSA Laboratory Test Procedure) dated April 1, 1974. 0IC

Standards Testing Labs., Inc. 1855 Harsh Ave. SE Massillon, Ohio 44646

To be completed one (1) year from date of contract award
\$17,617.50

DOT-HS-051-1-067 Mod. 21

ALCOHOL SAFETY ACTION PROJECT

Work will continue through April 30, 1975. Four (4) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the contract beginning January 1, 1972, and will be submitted no later than June 30 following the year reported on.

City of Oklahoma City Alcohol Safety Action Project 529
Hightower Bldg. 105 North Hudson Oklahoma City, Okla.
73102

Extended to 30 Jun 77
Increased \$499,028.00

DOT-HS-052-1-068 Mod. 19

ALCOHOL SAFETY ACTION PROJECT

Work will continue through April 30, 1975. Four (4) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the contract beginning January 1, 1972, and will be submitted no later than June 30 following the year reported on.

Office of the City Manager City of Phoenix 112 North Central Ave., Suite 304 Phoenix, Ariz. 85004
Extended to 30 Jun 77
Increased \$328,798.00

DOT-HS-053-3-609 Mod. 5

TRI-LEVEL STUDY OF THE CAUSES OF INJURY IN TRAFFIC ACCIDENTS

Calspan Corporation 4455 Genesee St. Buffalo, N.Y. 14221
Extended through 31 Dec 75
Increased \$395,857.50

DOT-HS-055-1-071 Mod. 18

ALCOHOL SAFETY ACTION PROJECT

Four (4) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the contract, commencing January 1, 1972, and will be submitted no later than June 30 following the year reported on.

New Hampshire Division of Public Health 61 Spring St.
Concord, N.H. 03301
Extended to 30 Jun 77
Increased \$279,697.00

DOT-HS-057-1-074 Mod. 15

ALCOHOL SAFETY ACTION PROJECT

A two (2) year continuation of the contract is granted. Reports on certain data will be submitted on a monthly and/or a quarterly basis with two (2) annual reports due on June 30, 1976 and June 30, 1977 respectively. 30

City of Columbus Office of the Mayor 100 - 10th St.
Columbus, Ga. 31902
Extended to 30 Jun 77
Increased \$26,750.00

DOT-HS-059-1-076 Mod. 18

ALCOHOL SAFETY ACTION PROJECT

Work will continue through April 30, 1975. Four (4) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the

contract, commencing January 1, 1972, and will be submitted no later than June 30 following the year reported on.

City of New Orleans Alcohol Safety Action Project 545 St. Charles Ave. Room 302 New Orleans, La. 70130
Extended to 30 Jun 77
Increased \$456,370.00

DOT-HS-062-1-080 Mod. 19

ALCOHOL SAFETY ACTION PROJECT

Work will continue through April 30, 1975. Four (4) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the contract, commencing January 1, 1972, and will be submitted no later than June 30 following the year reported on.

City of Tampa Office of the Mayor City Hall Tampa, Fla.
33602
Extended to 30 Jun 77
Increased \$296,995.00

DOT-HS-067-1-087 Mod. 22

ALCOHOL SAFETY ACTION PROJECT

Five (5) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the contract, commencing January 1, 1972, and will be submitted no later than June 30 following the year reported on.

Virginia Highway Safety Division Post Office Box 27472
Richmond, Va. 23261
Extended to 30 Jun 77
Increased \$360,000.00

DOT-HS-075-1-098 Mod. 15

ALCOHOL SAFETY ACTION PROJECT

Extension is granted for preparation and submission of evaluation data and reports for the post-operational phase of the Boston Alcohol Safety Action Project. Under conditions of a revised, detailed plan, effective January 1, 1975, certain data will be prepared on a monthly, quarterly and annual basis. Two (2) annual progress reports will be submitted no later than March 31, 1976 and March 31, 1977. ON L

Massachusetts Health Research Institute, Inc. 600 Washington St. Suite 625 Boston, Mass. 02111
Extended to 31 Mar 77
Increased \$15,000.00

DOT-HS-077-1-100 Mod. 15

ALCOHOL SAFETY ACTION PROJECT

Four (4) annual progress reports are to be submitted. These reports will cover the period January 1 through December 31 of each year of the contract beginning January 1, 1972, and will

August 29, 1975

DOT-HS-245-2-428 Mod. 6

be submitted no later than June 30 following the year reported on.

City of Kansas City 12th and Oak St. Kansas City, Mo. 64106
Extended to 30 Jun 77
Increased \$449,921.00

DOT-HS-090-2-477 Mod. 6

WEAVER PLATFORM BRAKE TESTER

Scope of the work "Design, assembly and/or construction of brake test system" is increased to cover a digital printout and memory storage of the measured and standard values along with the units as specified for performance tests and visual inspection. on

The Bendix Corporation Research Laboratories 20800 Ten and One-Half Mile Rd. Southfield, Mich. 48076
To be completed 15 May 75
Increased \$8,832.00

DOT-HS-190-2-480 Mod. 7

PEDESTRIAN ACCIDENT COUNTERMEASURES EXPERIMENTAL EVALUATION

The contractor will visit each of the cities of New York, Miami, Toledo, Akron, San Diego, Columbus, and Washington and make all efforts necessary to secure the cooperation of local police departments to continue furnishing the needed supplementary accident data to provide continuity of the existing data base. Data will be coded and converted to magnetic tape for detailed analysis using the accident typology sorting routine. Cities will be provided with a semi-annual and an annual statistical summary of the accident data.

Bio Technology, Inc. 3027 Rosemary Lane Falls Church, Va.
22042
Extended to 1 May 76
Increased \$45,459.00

DOT-HS-201-3-766 Mod. 4

RECREATIONAL VEHICLE ACCIDENT INVESTIGATION STUDY

Bilevel data acquisition system is extended in order to obtain two (2) full years of data. Data collection will be discontinued January 1, 1976. The number of multidisciplinary investigations of recreational vehicles is increased by fifteen (15) from 50 to 65. A minimum of ten (10) of these last fifteen (15) investigations will involve trailer towing accidents in order to focus upon accident phenomena unique to vehicles towing trailers.

University of Kentucky Research Foundation East Wing,
Kinhead Hall Lexington, Ky. 40506
Extended to 28 Feb 76
Increased \$82,536.00

DOT-HS-206-2-335 Mod. 6

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.). 0 ph

State of Missouri Division of Highway Safety 2634 Industrial Drive Jefferson, Mo. 65101
Extended to 31 Dec 77
Increased \$37,690.00

DOT-HS-224-2-384 Mod. 10

SELECTIVE TRAFFIC ENFORCEMENT PROGRAM PLAN

State of North Dakota North Dakota Highway Department Capitol Grounds Bismarck, N.D. 58501
Extended to 30 Sep 75
Increased \$11,500.00 cle

DOT-HS-233-2-400 Mod. 4

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.).

State of Alabama Department of Public Safety 500 Dexter Ave. Montgomery, Ala. 36102
Extended to 31 Dec 77
Increased \$24,918.00

DOT-HS-245-2-428 Mod. 6

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.). to

State of New York Dept. of Motor Vehicles Div. R and D, South Mall Swann Street Bldg. Albany, N.Y. 12228
Extended to 31 Dec 77
Increased \$50,400.00

DOT-HS-256-3-755 Mod. 1

PASSENGER VEHICLE AND LIGHT TRUCK SHOCK ABSORBER INSPECTION EQUIPMENT

Tracor/Jitco, Inc. 1300 E. Gude Drive Rockville, Md. 20851
 Extended to 31 Mar 75
 Increased \$5,000.00 02Re

DOT-HS-275-3-529 Mod. 4

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.). 0.).

State of Arkansas Public Safety Programs 116 National Old L%IME Bldg. L%ITTLE Rock, Arkansas 72201
 Extended to 31 Dec 77
 Increased \$40,399.00

DOT-HS-298-3-567 Mod. 3

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.). 0ns/

State of Maine Motor Vehicles Division 242 State St. Augusta, Me. 04330
 Extended to 31 Dec 77
 Increased \$8,084.00

DOT-HS-305-3-579 Mod. 3

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.).

Commonwealth of Massachusetts 146 Bowdoin St. Boston, Mass. 02108
 Extended to 31 Dec 77
 Increased \$29,233.01

DOT-HS-307-3-581 Mod. 3

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.).

State of California Office of Traffic Safety 2570 24th St. Sacramento, Calif. 95815
 Extended to 31 Dec 77
 Increased \$79,500.00

DOT-HS-319-3-615 Mod. 4

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, drivers, vehicles, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.).

State of West Virginia 922 Quarier St. Charleston, W. Va. 25301
 Extended to 31 Dec 77
 Increased \$16,000.00

DOT-HS-331-3-636 Mod. 3

FATALITY ACCIDENT FILE

Reports of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, drivers, vehicles, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.).

State of Oregon Motor Vehicle Division 1905 Lana Ave., N.E. Salem, Ore. 97310
 Extended to 31 Dec 77
 Increased \$7,645.00

DOT-HS-338-3-651 Mod. 3

FATALITY ACCIDENT FILE

Report of all motor vehicle traffic accidents in which there is a fatality constitute the Fatality Accident File (FAF). Included are data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants. The contractor will prepare and provide a report concurrently with its submission of cases

August 29, 1975

which will identify the counts of each type of submission (initial cases, alterations/corrections, etc.).

State of Michigan Department of State Police Office of Highway Safety Planning 1020 Long Boulevard, Suite 14 Lansing, Mich. 48910
Extended to 31 Dec 77
Increased \$44,118.00

DOT-HS-356-3-719 Mod. 1

PEDESTRIAN MODEL PARAMETRIC STUDIES

Analytical investigations based on the results of tests performed by Battelle will include sensitivity of the optimal design due to variation in the pedestrian's height, weight, and joint characteristics, velocity of impact, and amount of vehicle braking; possible modifications to the pedestrian-vehicle model should the experimental impacts indicate poor correlation; and specification of a cost effective matrix to verify that the optimal design is a good design and validates trends observed in the sensitivity analysis. Goal of the combined analytical and experimental efforts of Boeing and Battelle is the development of a vehicle front-end which presents a minimum impact hazard to a pedestrian. Selected National Highway Traffic Safety Administration personnel will be provided access to the Boeing Computer Services, the Prometheus 2 model and the entire optimization routine. Cost

Boeing Computer Services, Inc. P.O. Box 24346 Seattle, Wash. 98124
To be completed nine (9) months from date of modification
\$97,637.00

DOT-HS-4-00965

DEVELOPMENT OF NEW AND IMPROVED COUNTERMEASURES PROGRAMS FOR ALCOHOL RELATED HIGHWAY CRASHES

A six (6) man ad hoc group will hold a two (2) day meeting to review and report on the NHTSA Standard for Screening Breath Alcohol Testers and the modifications to the Standard for Evidential Breath Testers.

National Safety Council 425 North Michigan Ave. Chicago, Ill. 60611
No change
\$5,090.65

DOT-HS-4-00968 Mod. 3

DEVELOPMENT OF A LOW COST PORTABLE FLUORIMETRY TECHNOLOGY FOR DETECTION AND QUANTIFICATION OF CANNABANOID IN BODY FLUIDS AND BREATH

The contractor shall prepare a detailed research plan which describes step-by-step development and validation of the new analytical technique. A report describing how the new test, if successful, could be used in a highway safety program, and what impact on the marihuana driving problem could be an-

anticipated is to be furnished to the National Highway Traffic Safety Administration. 0ed

University of Missouri 817 Clark Hall Columbia, Mo. 65201
To be completed twelve (12) months from date of modification award
Increased \$96,120.00

01DOT-HS-042-3-783 Delivery Order 6

LABORATORY TEST PROCEDURES

Testing of ten (10) passenger vehicles in accordance with FMVSS No. 216 dated May 18, 1973 (NHTSA Laboratory Test Procedures will be accomplished. Octo

Ogden Technology Lab., Inc. 1536 East Valencia Drive Fullerton, Calif. 92631
No change
\$15,050.00

DOT-HS-048-1-064 Mod. 24

ALCOHOL SAFETY ACTION PROJECT

Department of Public Safety State of Minnesota 211 Highway Building St. Paul, Minn. 55101
No change
Increased \$141,583.00 00)

DOT-HS-5-01017 Task Order No. 4

LABORATORY TEST PROCEDURES

Evaluations tests of the General Motors air cushion restraint will be made. wit

Calspan Corporation P.O. Box 235 Buffalo, N.Y. 14221
No change
\$93,987.00

DOT-HS-5-01074 Delivery Order No. 3

LABORATORY TEST PROCEDURES

Eight (8) passenger vehicles will be tested in accordance with FMVSS Nos. 204, 212, and 301 dated May 18, 1973 (NHTSA Laboratory Test Procedures) Octo

General Environments Corporation 6840 Industrial Rd. Springfield, Va. 22151
No change
\$46,920.00

DOT-HS-5-01099 Task Order No. 2

HSL 75-8

DOT-HS-5-01099 Task Order No. 2

**CAR-TO-CAR AND CAR-TO-BARRIER IMPACT
TESTING**

Evaluation of geometric aggressiveness of full-size automobiles
will be made.

Calspan Corporation Buffalo, N.Y. 14221
To be completed six (6) months from date of Task Order
\$81,299.00

NHTSA-5-1718 Mod. 1

**ALCOHOL SAFETY ACTION PROJECT
EVALUATION SYSTEM**

Teknekron, Inc. 2118 Milvia St. Berkeley, Calif. 94704
No change
Increased \$20,183.25

* U.S. GOVERNMENT PRINTING OFFICE: 1975-211-167/5

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